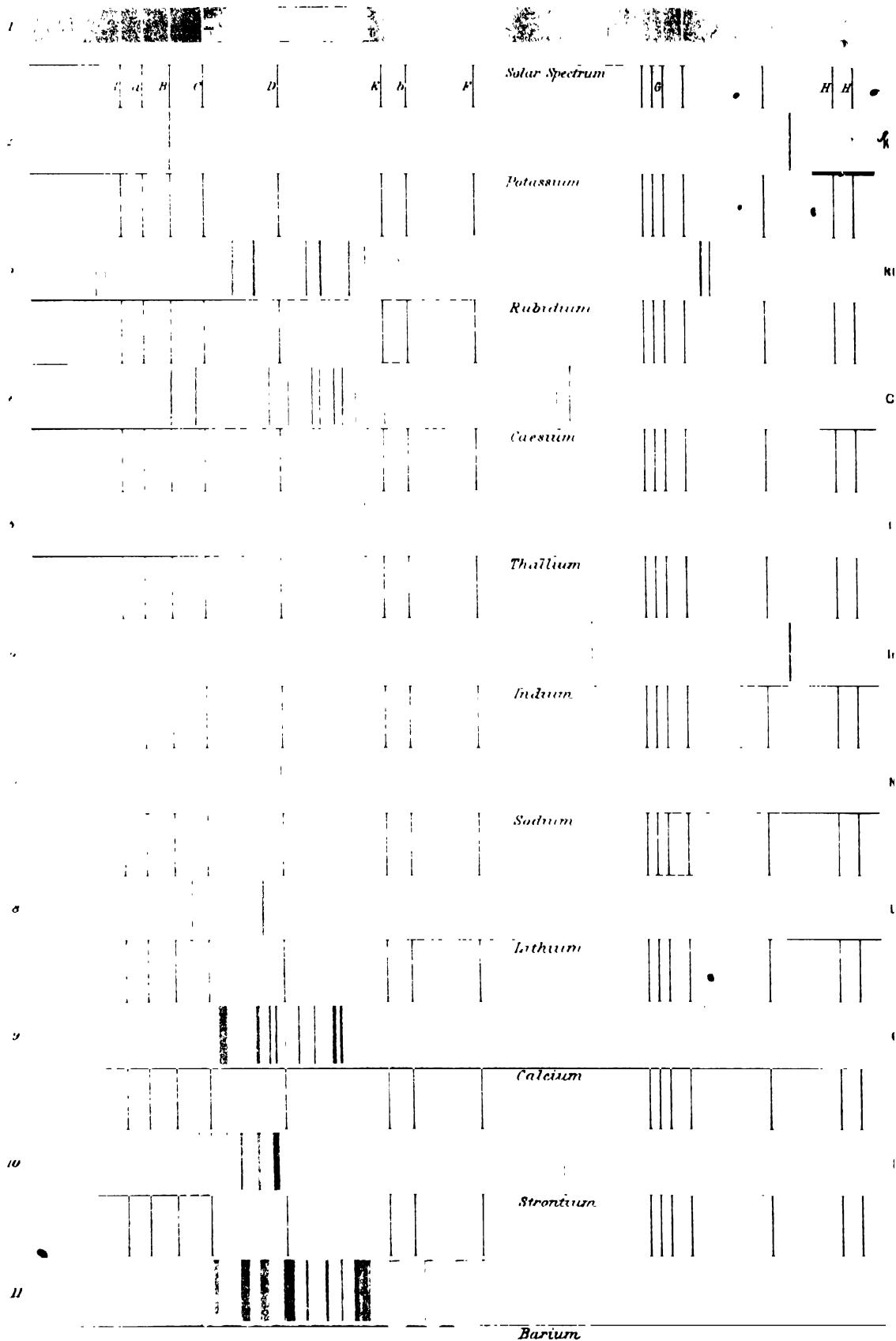






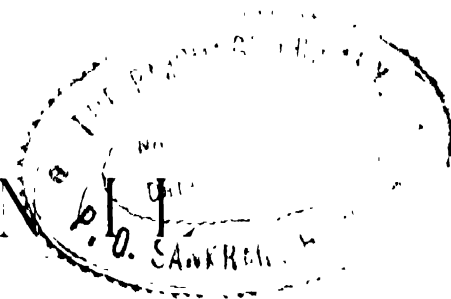
SPECTRUM ANALYSIS.

0% 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170





The
NATION



ENCYCLOPEDIA

A DICTIONARY OF UNIVERSAL KNOWLEDGE

By

WRITERS OF EMINENCE IN

LITERATURE, SCIENCE, AND ART

VOLUME XII

LONDON

WILLIAM MACKENZIE, 69 LUDGATE HILL, E. C.

EDINBURGH AND GLASGOW

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 2 *Limnias ceratophylla*
 3 *Obolus hyalinus*
 4 *Philodina aculeata*

5 *Rotifer macrochus*
 6 *Callubma elegans*
 7 *Paracalanus gibba*

8 *Dugesia grandis*
 9 *Gastropoda hana*
 10 *Brachionus amphicercus*
 11 *Notocis quadricornis*

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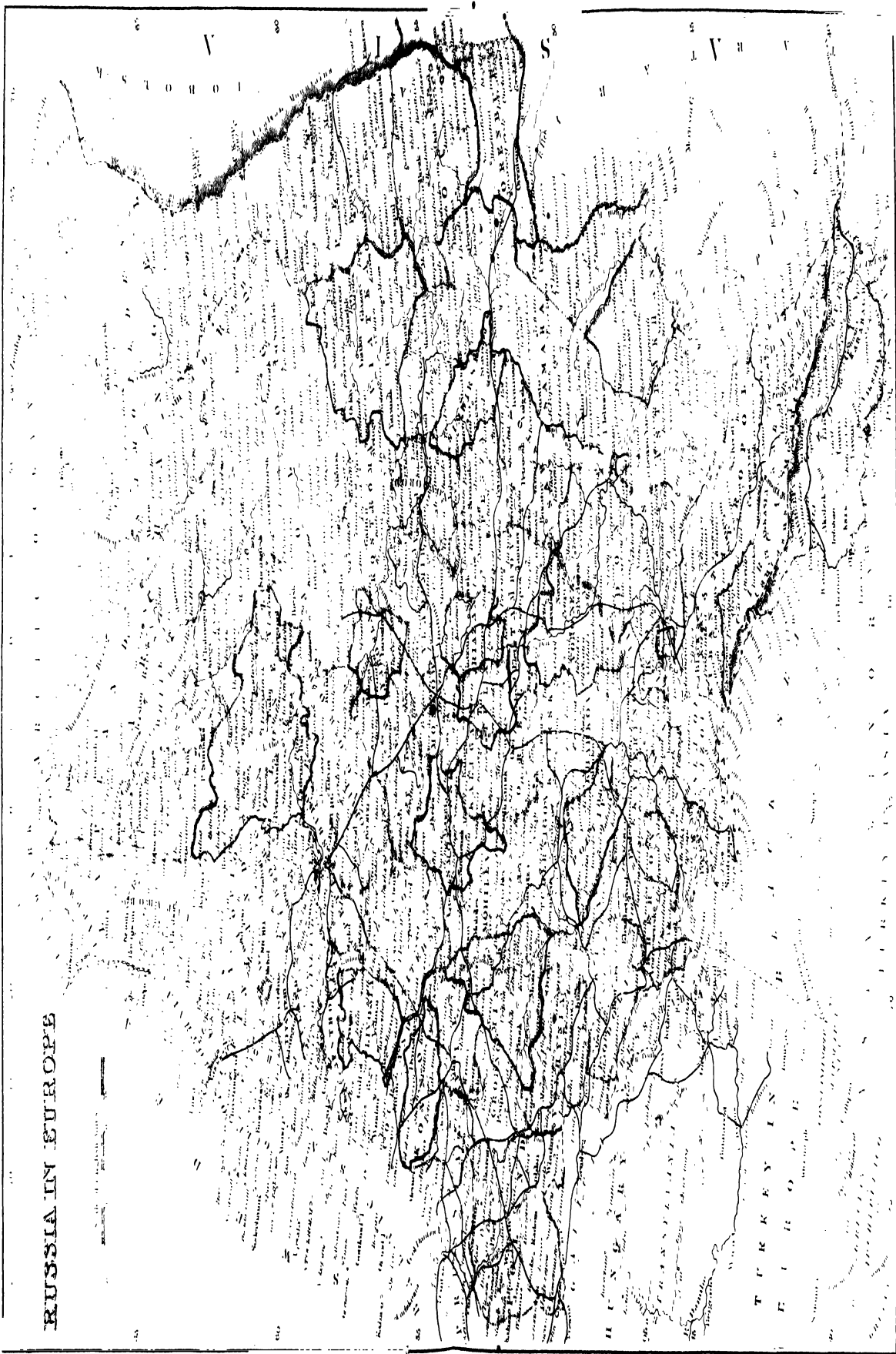
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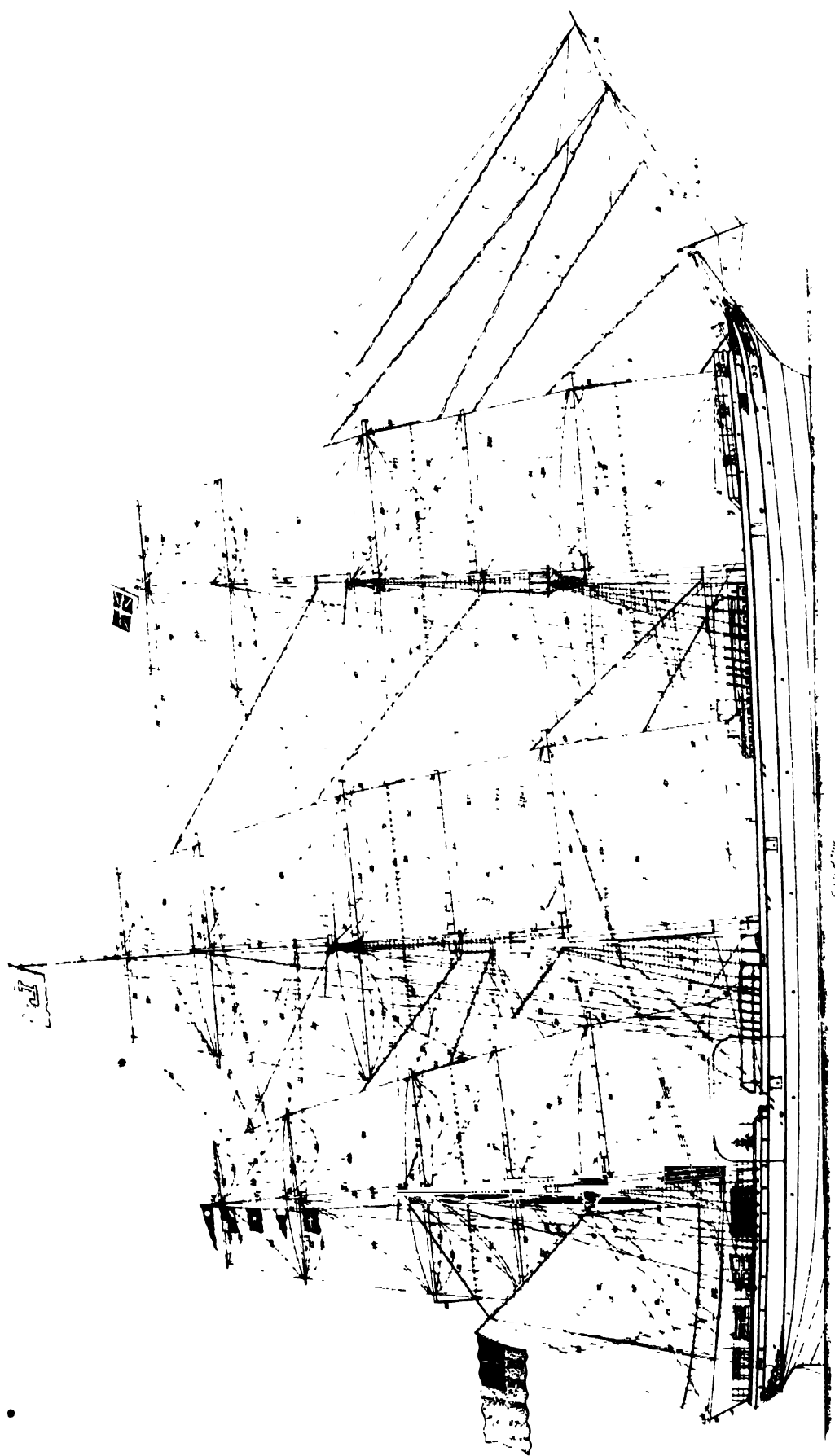
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RUSSIA IN EUROPE





View of Starboard
Fig. 11



Corythaux persa Parula



Cuculus canorus Cuckoo



Rhamphastor dicolorus Red-breasted Toucan



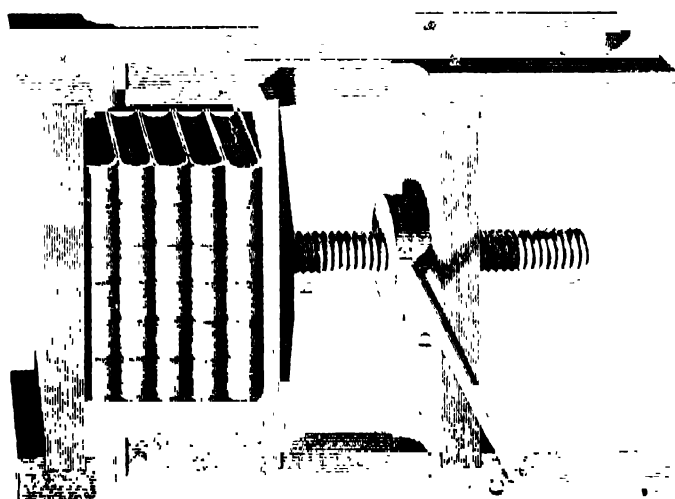
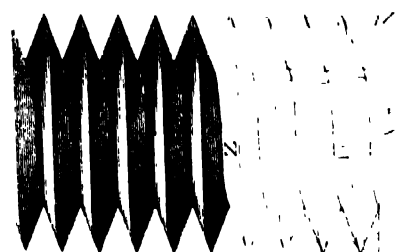
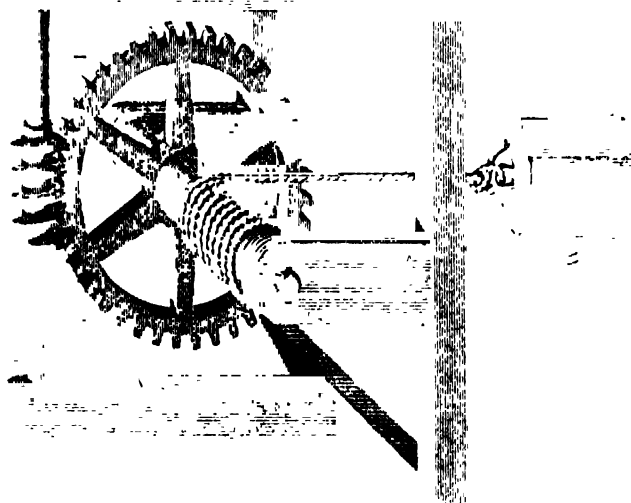
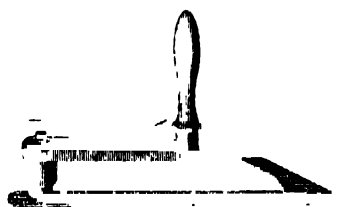
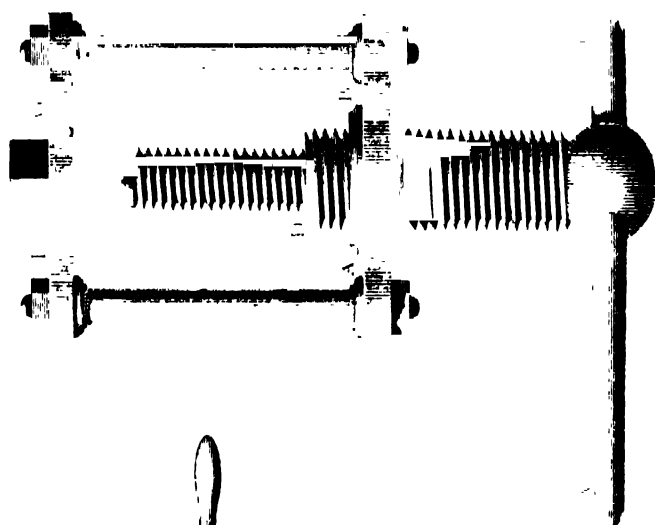
Pteroglossus macaw Macaw

SCOTLAND

Scale of English Miles

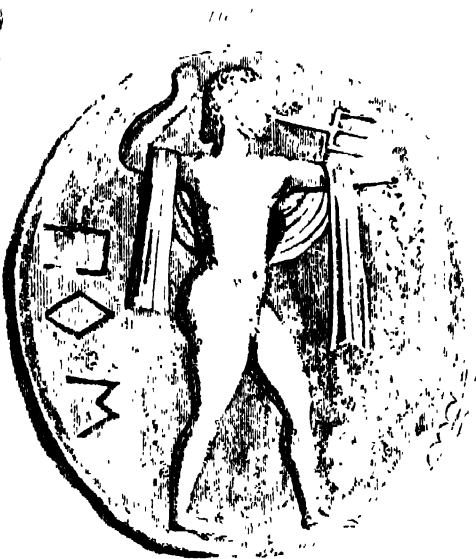
0 10 20 30 40 50







EGYPTIAN



EGYPTIAN COIN



EGYPTIAN FEMALE FIGURE



EGYPTIAN



EGYPTIAN MALE FIGURE

ANCIENT

Fig. 1

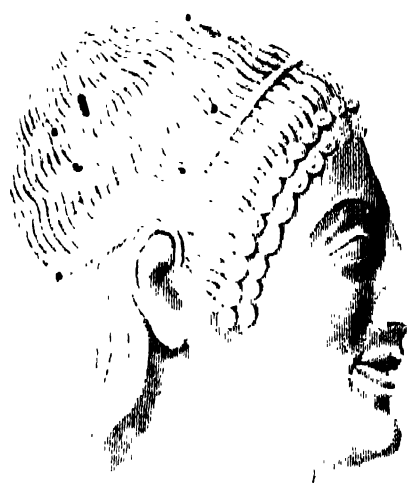


Fig. 2



Fig. 3



Fig. 4



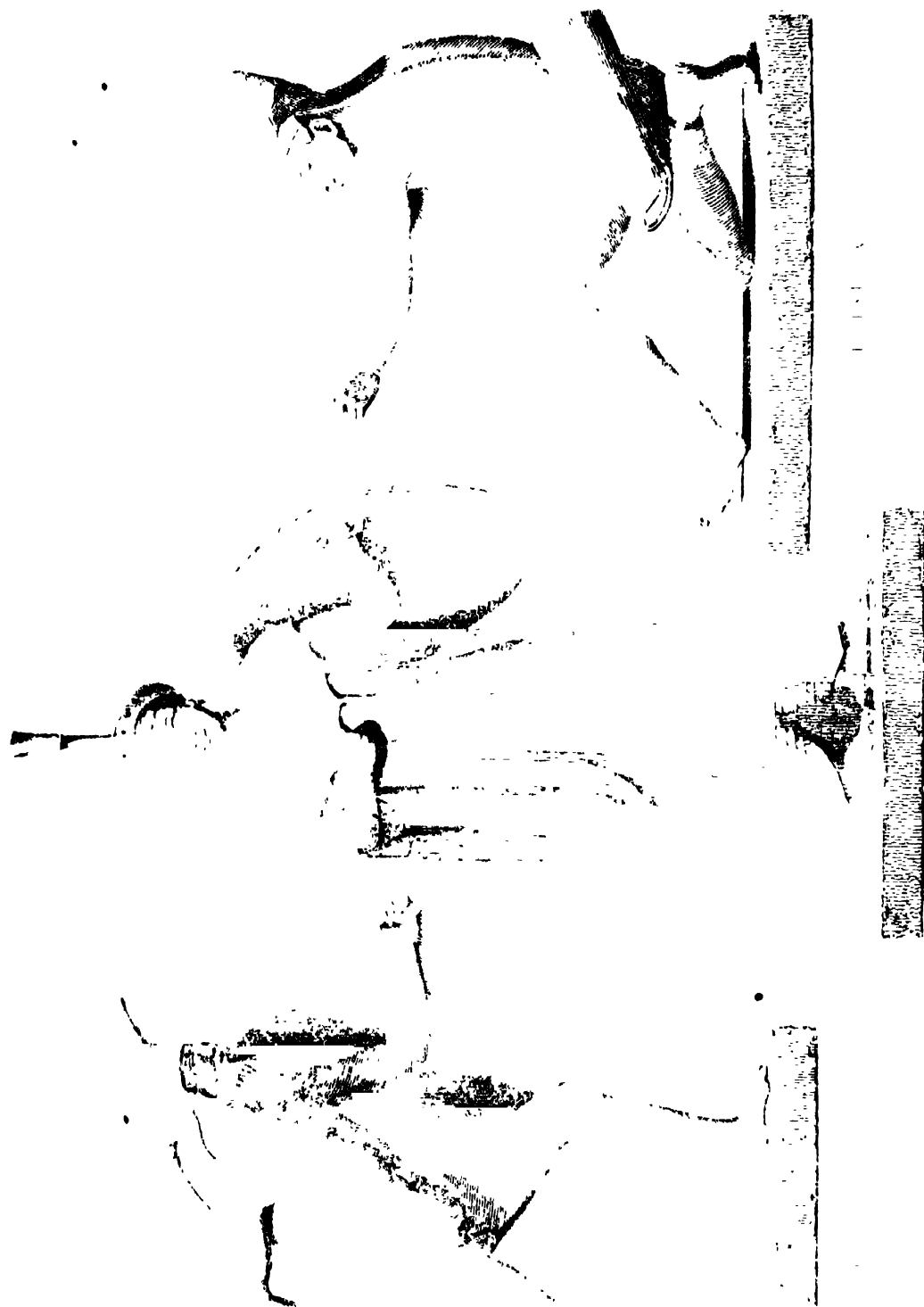
Fig. 5

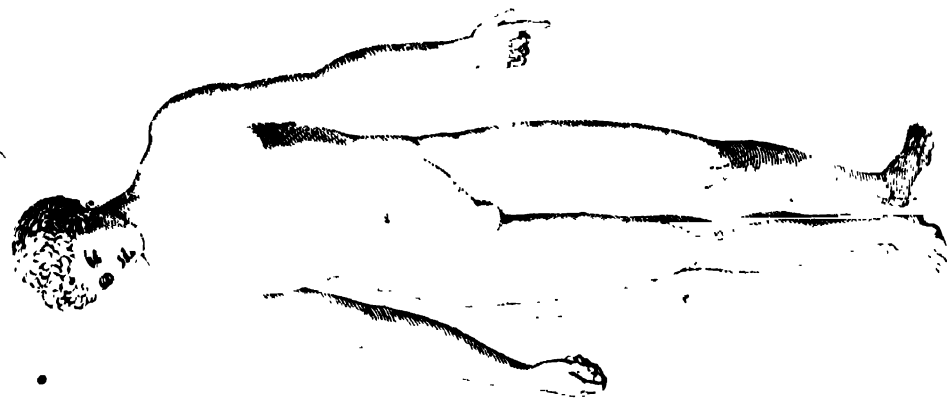
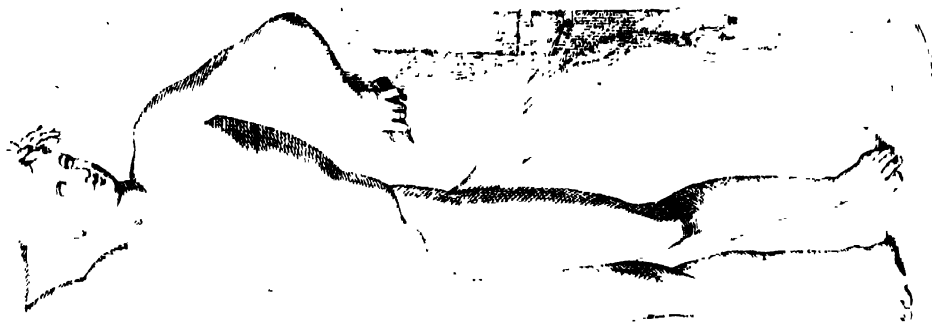


Fig. 6









1101

G R E E K



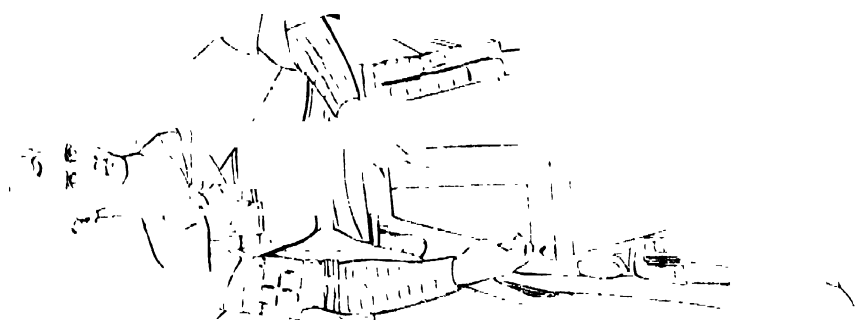
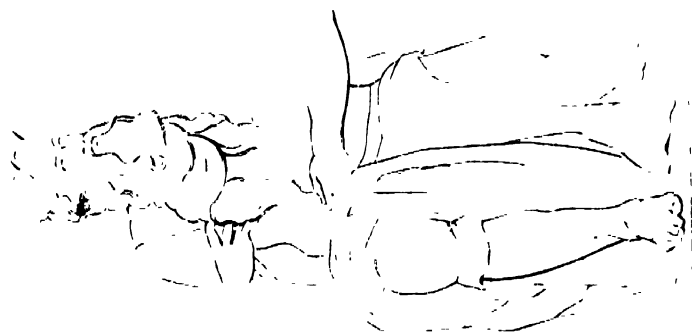
THE BULL OF NEMEA
HERACLES

1102

DISCOBOLOS OF MURON



THE BULL OF NEMEA
HERACLES



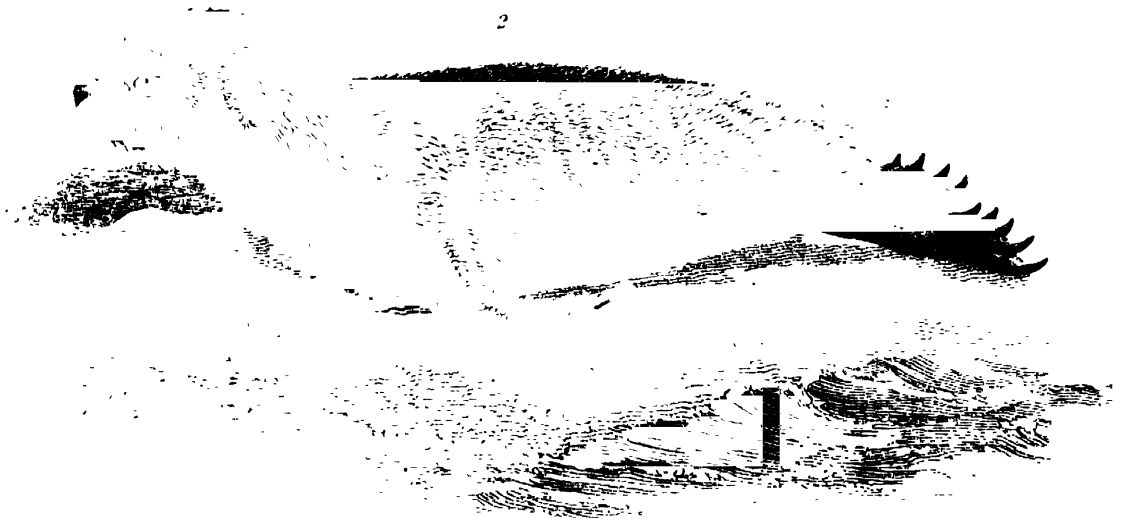




S E A L



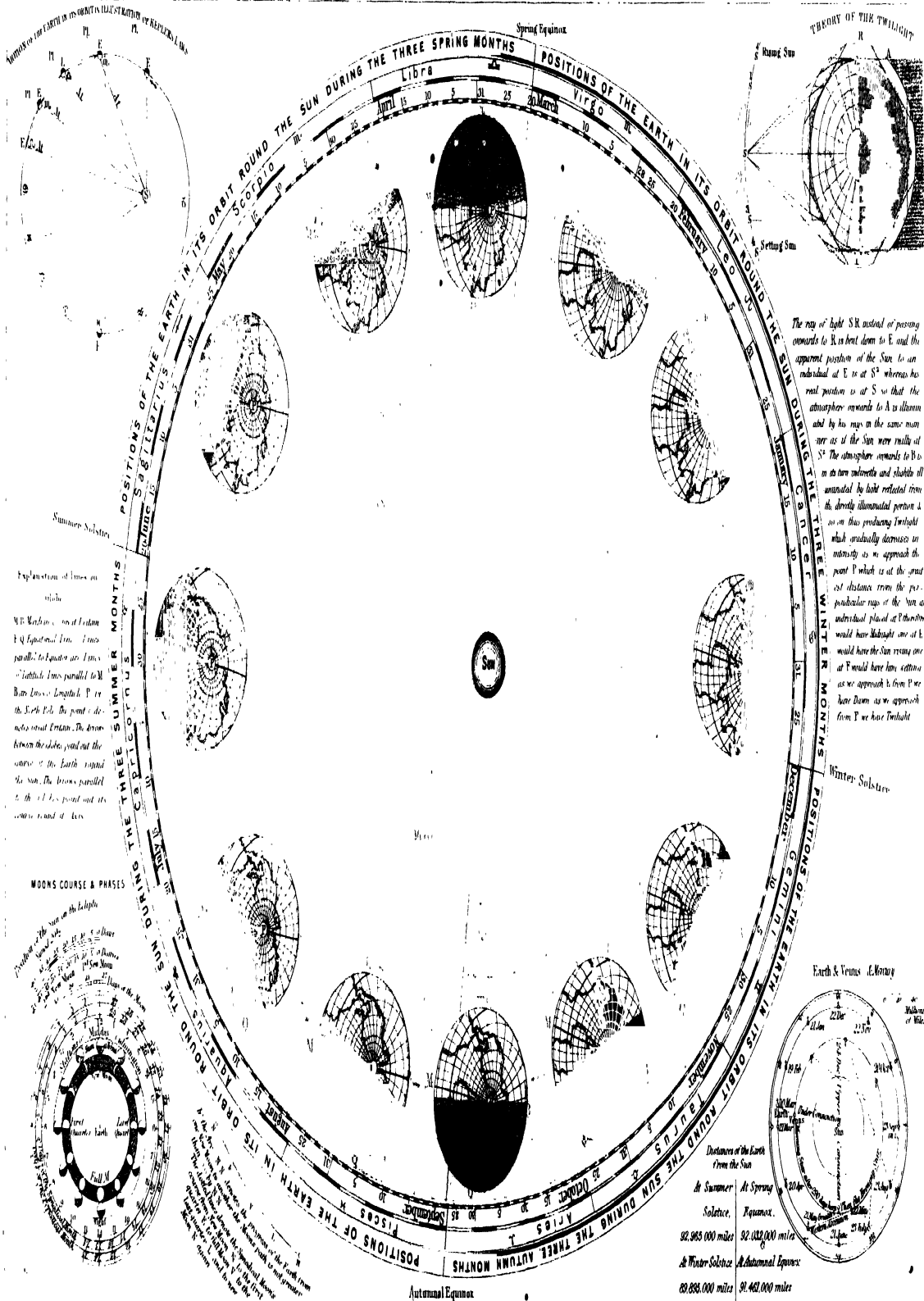
Phoca vitulina . *Common Seal*



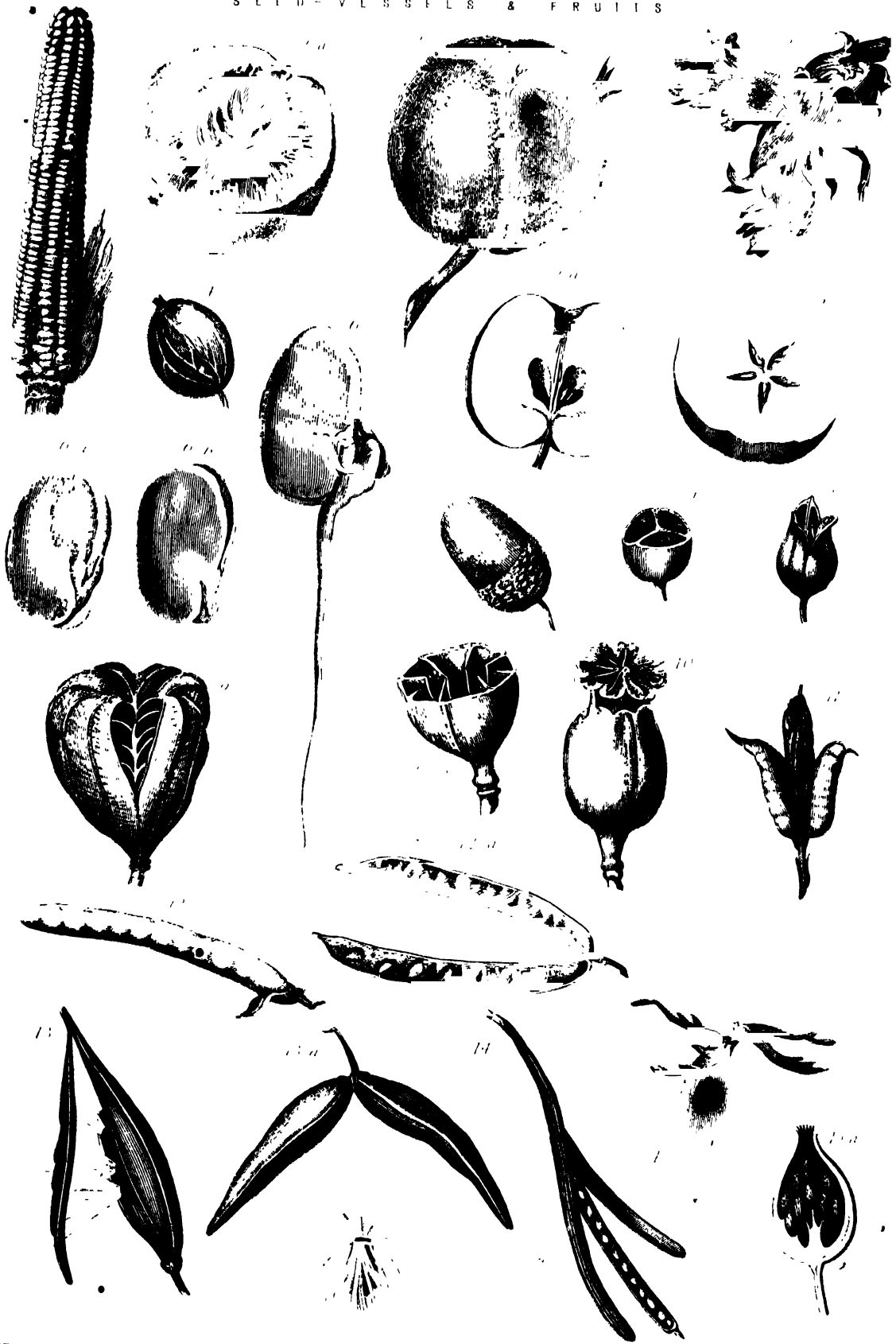
Otaria usinur . *Northern Fur Seal or Sea Bear*

SEASONS.

ANNUAL REVOLUTION OF THE EARTH ROUND THE SUN



SEEDS
SLID-VESSELS & FRUITS

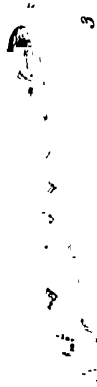




Crotalus durissus . Banded Rattle snake



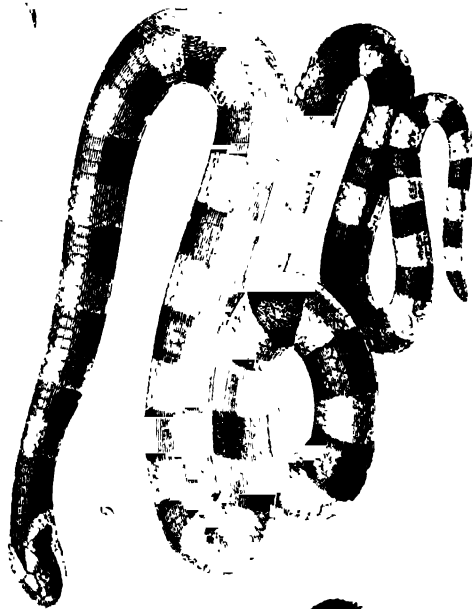
Trachisurus viridis



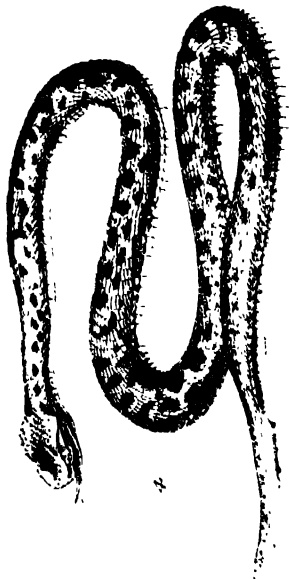
Pelias heros . Common Kiper



Naja naja . Cobras

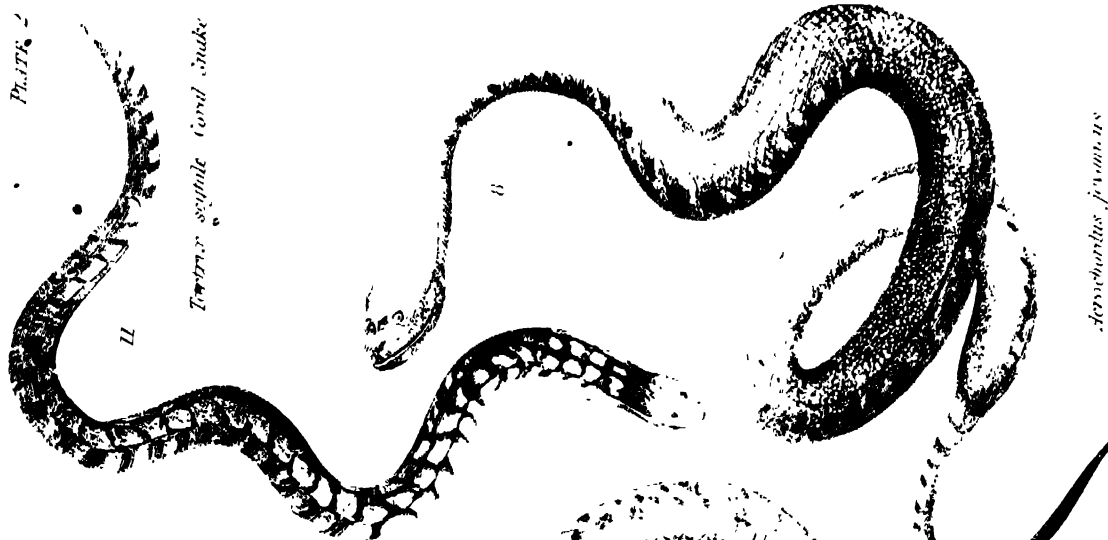


Bungarus fasciatus



Caracus hirtellus

Tropis septata Coral Snake



Atractaspis jamaicensis



Rhombophis melanurus Rock Snake



Polyodon hexalepis Mud Snake





Ovis ammon Ammon

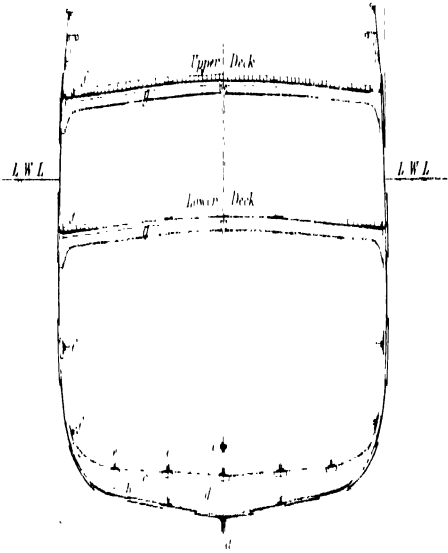


Ovis montanus Berg Goat



Capra ibex Ibex

MIDSHIP SECTION

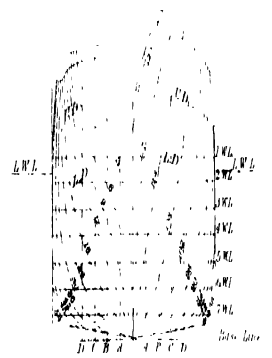


SHEER DRAUGHT OF AN IRON SAILING SHIP

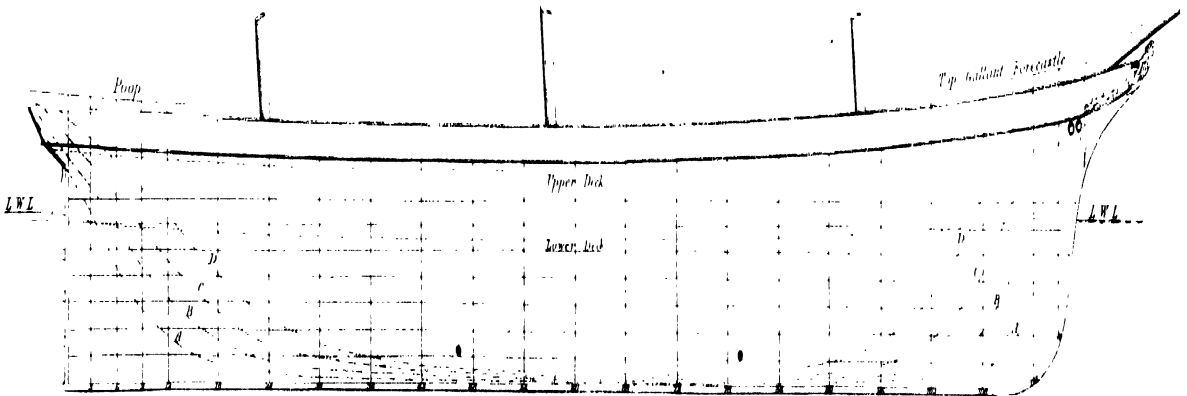
DIMENSIONS

Length on level line 238 feet
 Breadth 38
 Depth from deck at side 5
 to bottom of keel

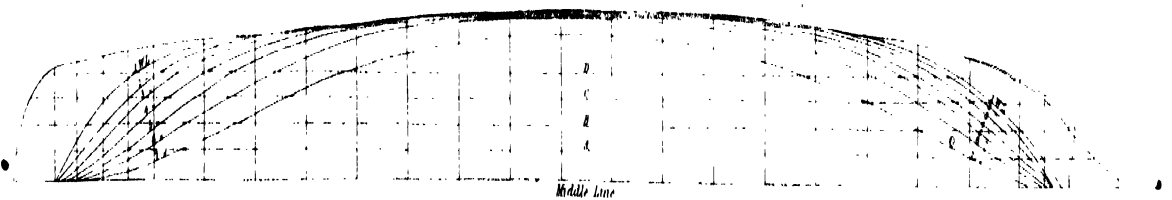
BODY PLAN



SHEER PLAN



HALF-BREADTH PLAN

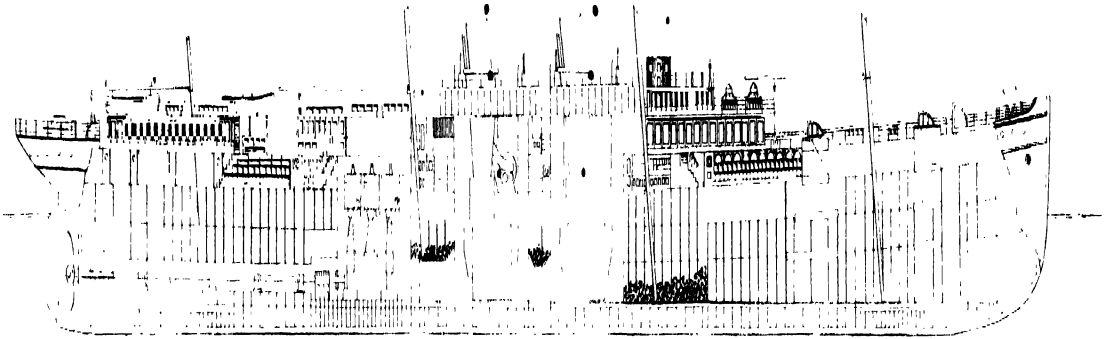


SHIP-BUILDING.

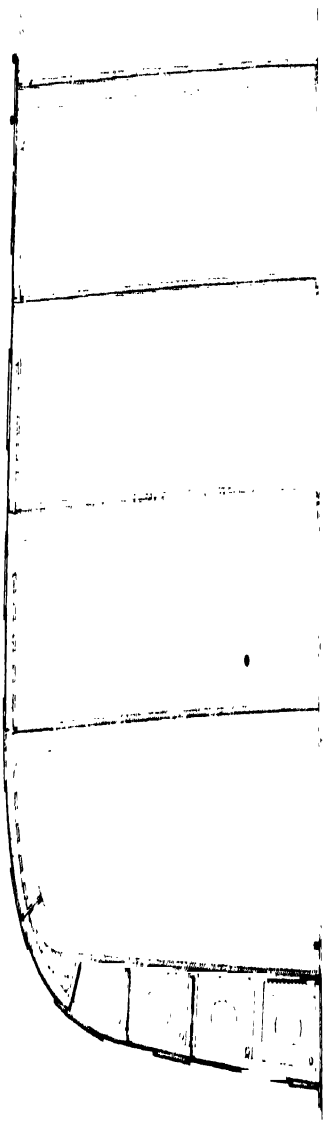
PLATE 2

S. S. "AUSTRAL"

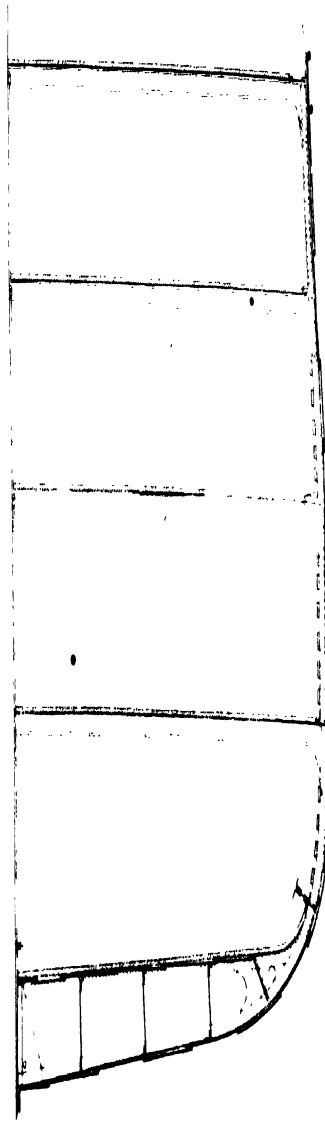
PROFILE PLAN



MIDSHIP



SECTION



SINGLE AND DOUBLE CONSONANTS

Name	as it	L HOOR	R HOOR	N HOOR	HALF LENGTH
pee P, pea		pl	pr	pn	pt
bee B, bee		bl	br	bn	bd
tee T, tea		tl	tr	tn	tt
dee D, day		dl	dr	dn	dd
chay CH, chair		chl	chr	chn	cht
jay J, jam		jl	jr	jn	jd
kay K, come		kl	kr	kn	kt
gay G, go		gl	gr	gn	gd
ef F, fie		fl	fr	fn	ft
vee V, vie		vl	vr	vn	vd
ith TH, thin		thl	thr	thn	tht
thee TH, then		thl	thr	thn	thd
es S, see		S	st	sn	st
zee Z, zeal		Z		zn	zd
ish SH, she		shl	shr	shn	shd
zher ZH, vision			zhr	zhn	zhd
em M, me		ml	mr	mn	mt
en N, no		nl	nr	nn	nd
ing NG, sing			ngr	ngn	
el L, law			lr	ln	ld
ur R, ray		R	rp	rn	rd
W	wl wh whl	Y	H	kw gw mp omb mfr m'n	

TREBLE CONSONANTS, USED ONLY INITIALLY.

spr str skr as in spray straw screw

VOWELS AND DIPHTHONGS

Short	Long
a e i o ũ oo	ah eh ee aw o oo
um ill ell olve, uo, fat, alms, ale, ell, all, spe, told	
1 isle, ow, owl, al, ay, oi, oil, u, tune, fend, new	
The diphthongs i ow, must be written in any position	

DOUBLE LETTERS OF THE W AND Y SERIES

wà wè wĩ wo wũ wòo	yà yě yĩ yò yu yòo
Short	
as in wag, wet, wail, was, wain, wood	gam yet, yit, yo, young, yod
wah weh wee waw wò wòo	yah yeh yee yaw yò yoo
Long	
as in qualm, waw, we, wail, woke, woe	yah, yea, ye, yaien, yoke, yoo

GRAMMALOGUES

A or an	have	several
above	he	shall
according	him	short
advantage	himself	should
after	how	so
ago	however	spirit
all	I	Thank
and up	if	that
any	in	the
are	is, his	their there
as has	it	them
at	important	these
awe	improvement	thing
Be	Lord	think
because	May	this
been	me my	those
beyond	member	though
but	mere	through
by	might	to
Call	more	to be
can	Mr	told
cannot	myself	toward
care	Nature	truth
come	near	two too
could	no	Under
Differen	nor	up
difficult	not	upon
do	number	us
Doctor	O oh owe	Very
done	of	Was
during	on	yet
Each	one	we
equally	opinion	what
ever-y	opportunity	when
First	or	which
for	other	while
from	our	who
General	out	when
Gentleman	over	whose
Gentlemen	Particular	why
give n	Phonography	will
go	pleasure	with
God	principally	without
good	put	word
great	remember	would
Had	see	Year
hand	language	you
happy	large	your

Learner's Style (Luke ch 6, ver 20)

20 *Forasmuch as ye are poor, ye have need of alms: but ye have need of the richer word which shall not perish, that ye may abound in that which is not seen.*

21 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

22 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

23 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

CORRESPONDING style

20 *Forasmuch as ye are poor, ye have need of alms: but ye have need of the richer word which shall not perish, that ye may abound in that which is not seen.*

21 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

22 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

23 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

46 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

47 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

48 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

49 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

50 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

REPORTING style (Luke ch 6, ver 20)

46 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

47 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

48 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

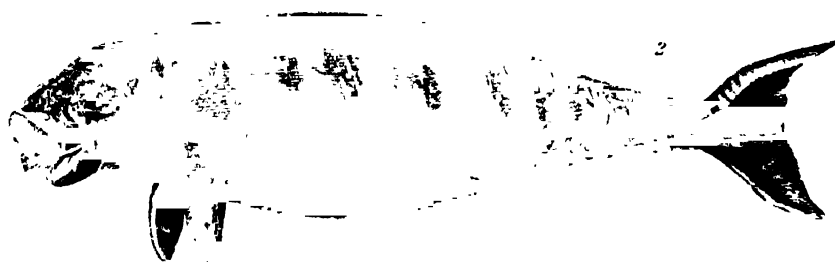
49 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

50 *Forasmuch as ye have despised me, your Father in heaven will despise you also.*

SIRENIA.



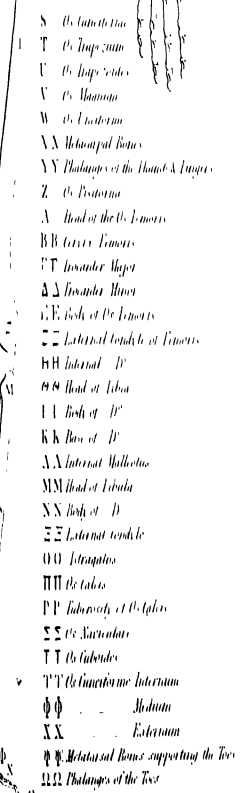
Manatus australis ——— American Manatee.



Halucore dugong Dugong.



Rhytina stelleri — Steller's Rhytina.





*Parietal Bone
Outer and Inner
View*



*Ethmoid
upper surface*



*ethmoid bone
inner view*



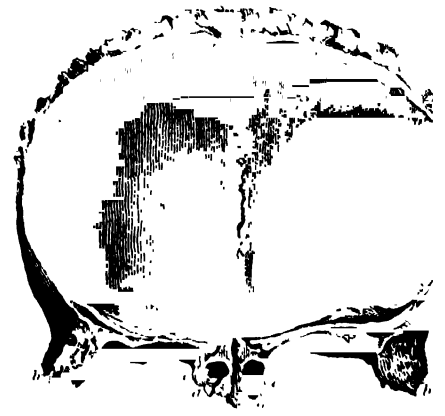
Sphenoid



*Temporal Bone, Outer and
Inner View*



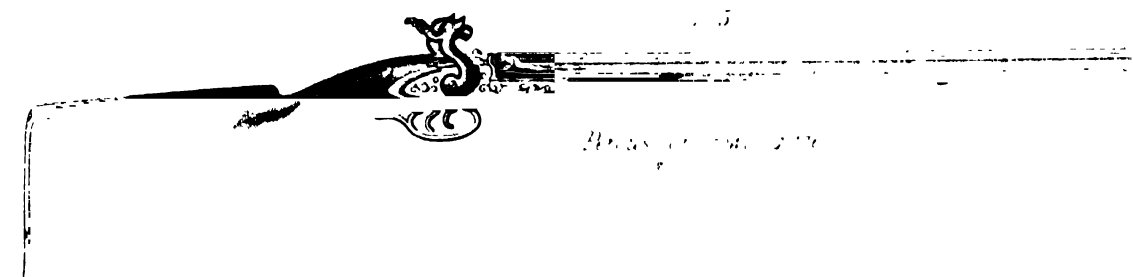
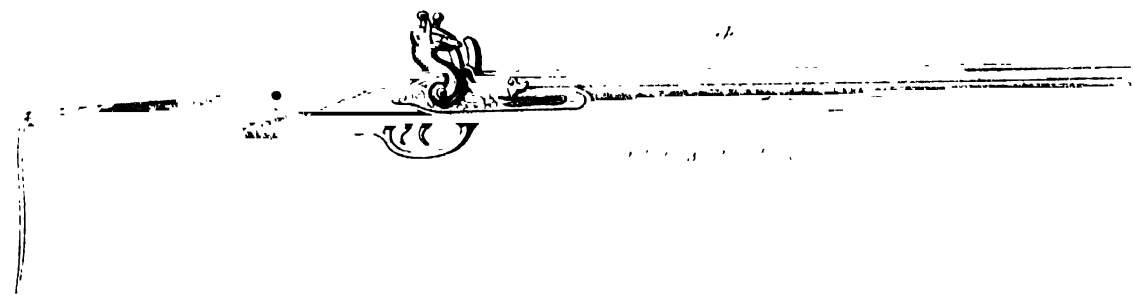
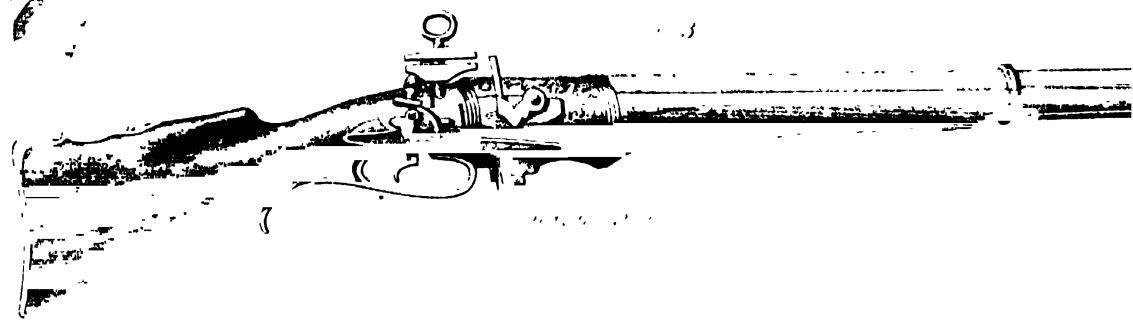
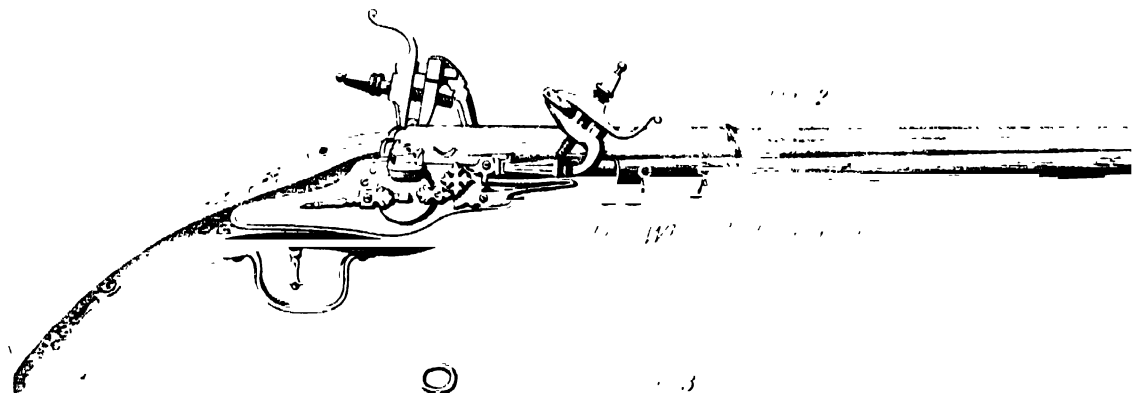
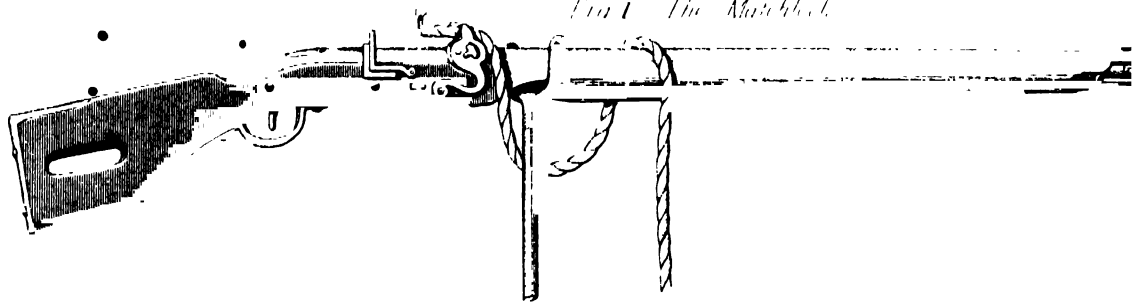
*Ethmoid
under surface*



*Frontal Bone
Outer and Inner
View*

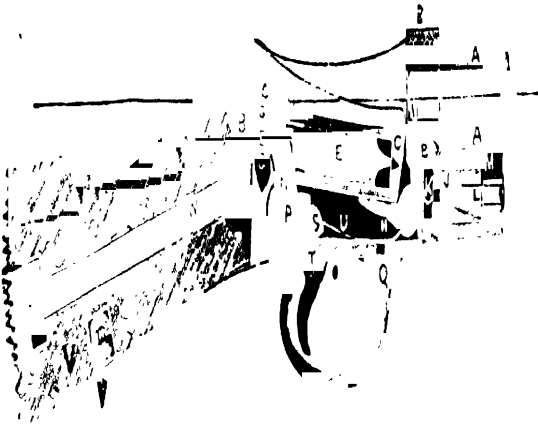
EARLY TYPES

FIG. 1 The Matchlock

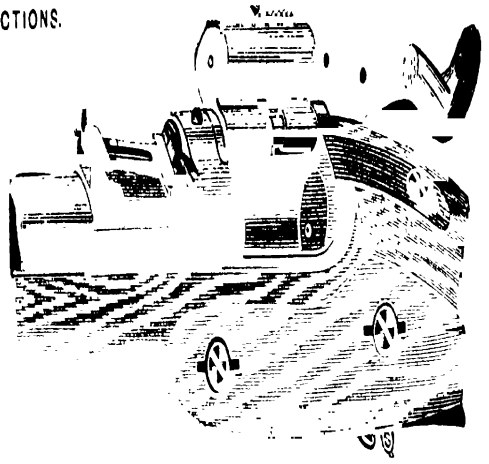


SMALL ARMS.

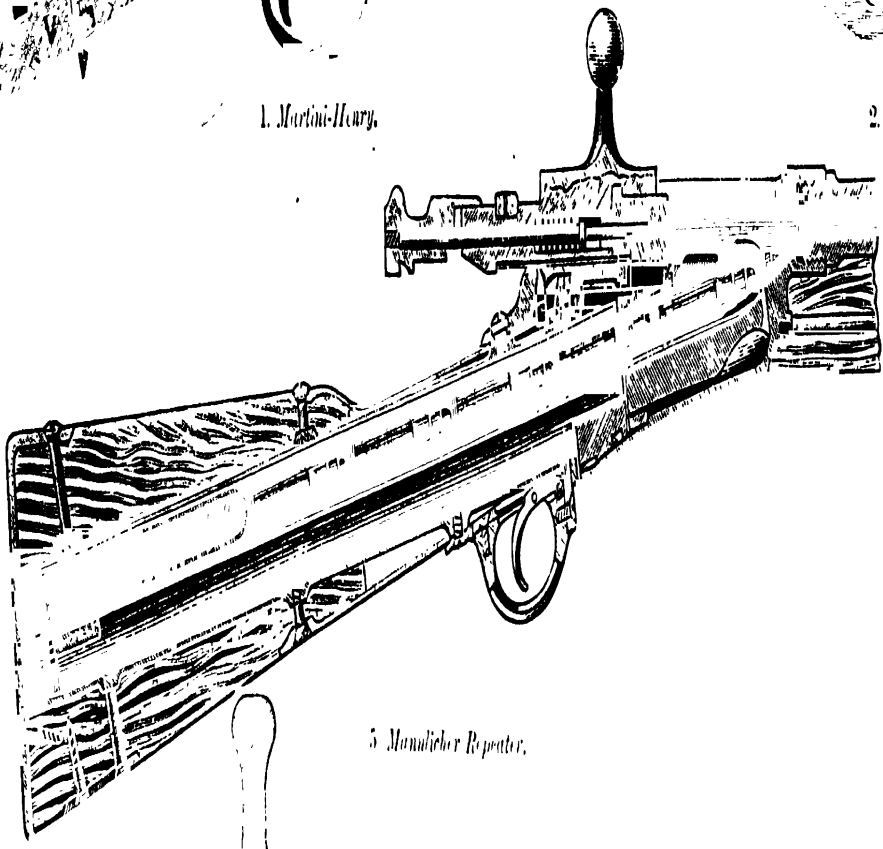
MODERN MILITARY BREECH ACTIONS.



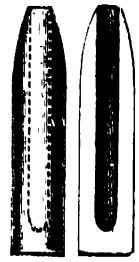
1. Martini-Heery.



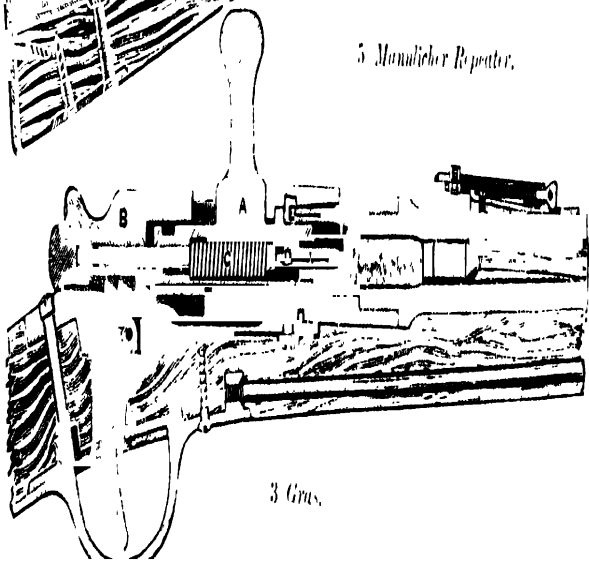
2. Snider.



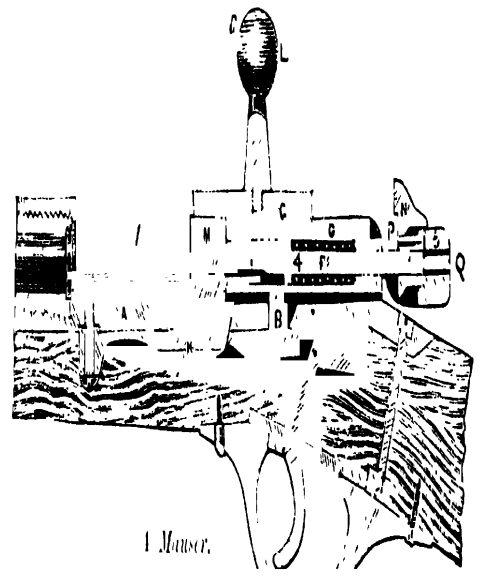
3. Mauser Repeater.



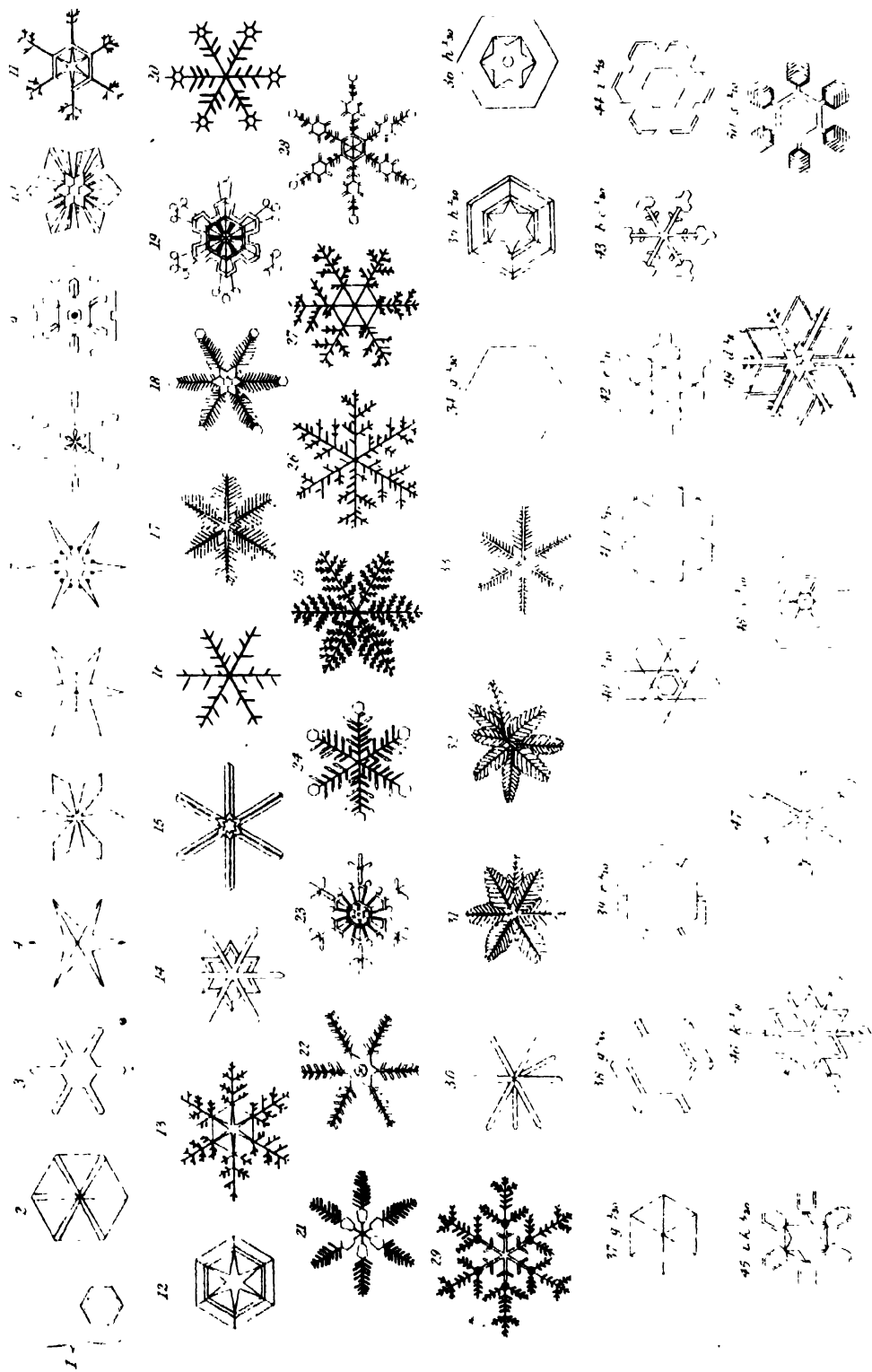
Express Rifle Bullets.

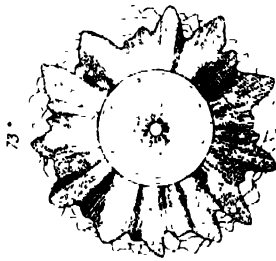
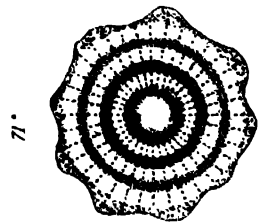
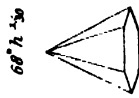
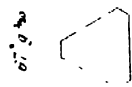
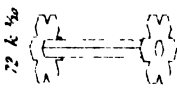
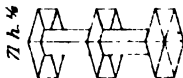
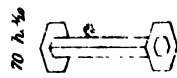
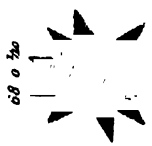
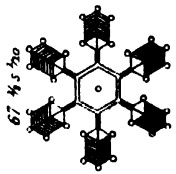
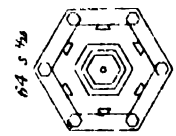
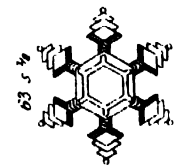
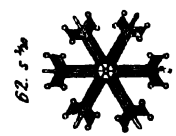
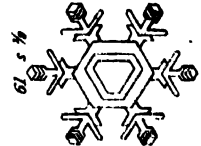
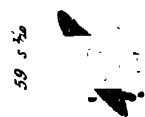
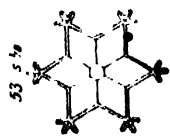


4. Gras.



5. Mauser.





SOLAR SYSTEM.

Comparative Magnitude of the Planets

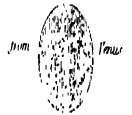
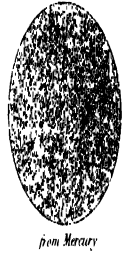
- Mercury
- Venus
- Earth
- Moon
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune
- Pluto

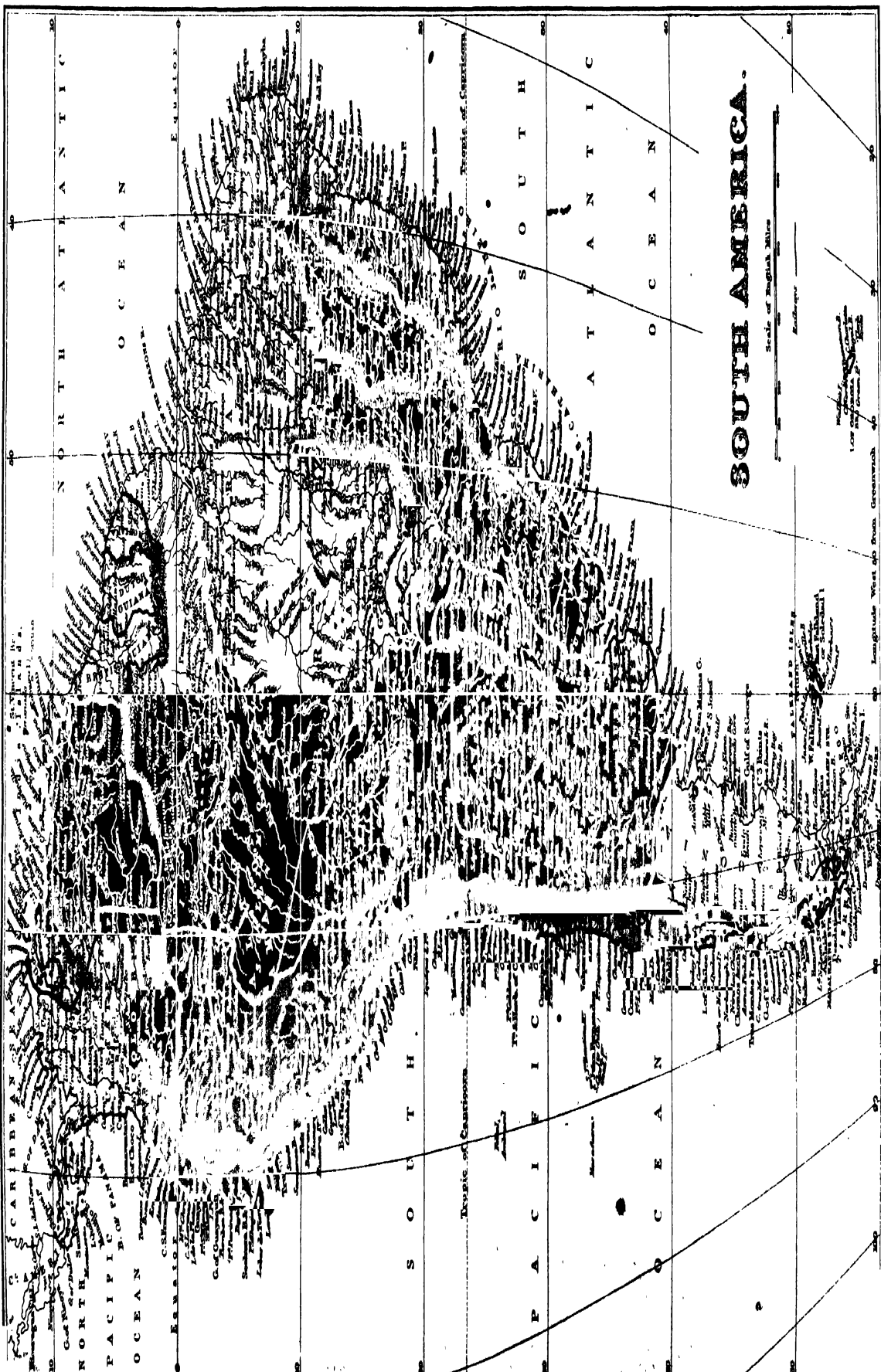


Signs of the Planets

- ☿ Mercury
- ♀ Venus
- ♁ Earth & Moon
- ♂ Mars
- ♃ Jupiter
- ♄ Saturn
- ♅ Uranus
- ♆ Neptune
- ♇ Pluto

Comparative Magnitude of the Sun seen from each Planet





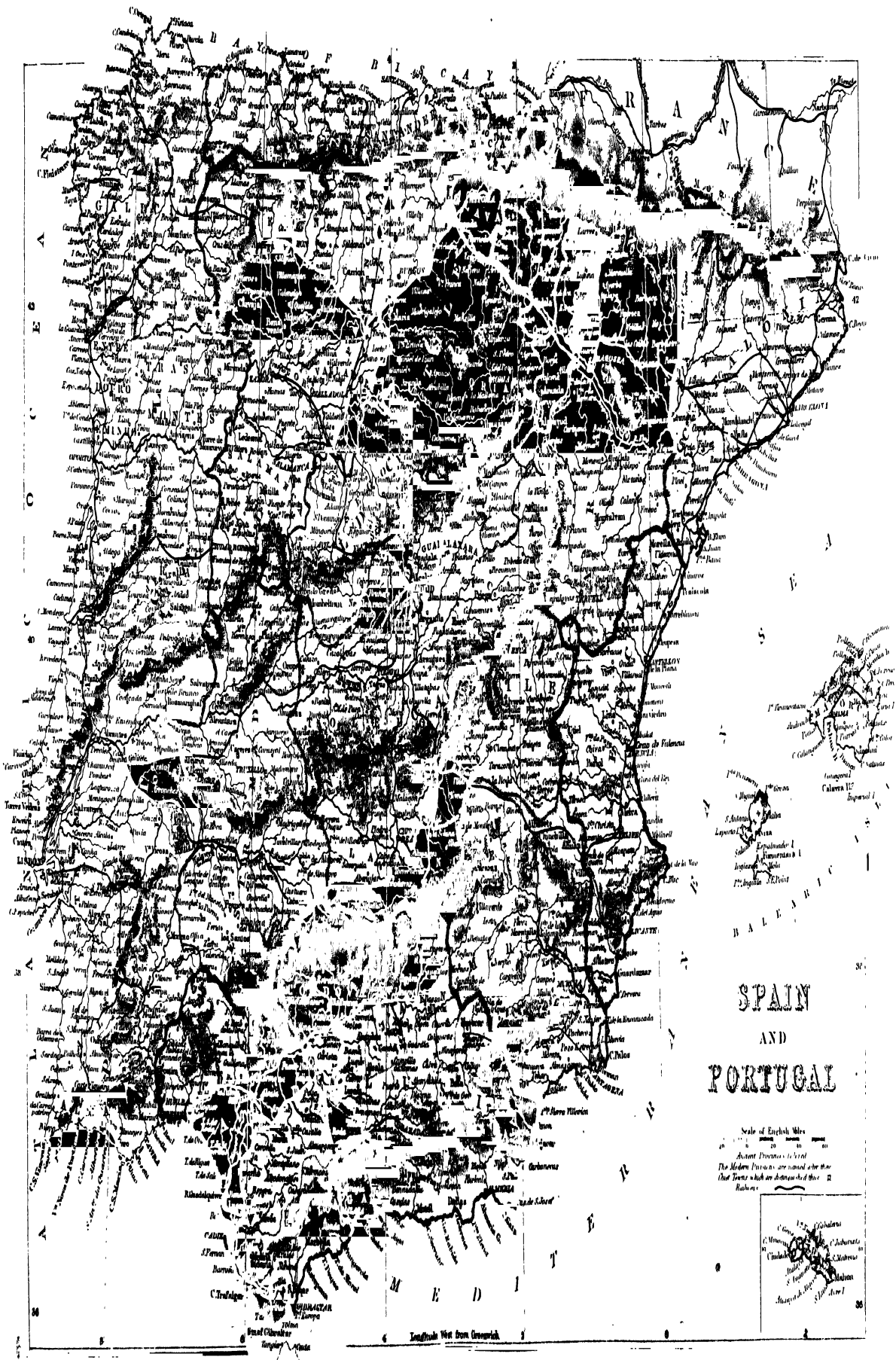
SOUTH AMERICA.

Scale of English Miles

Longitude

Low Water in Ocean
High Water in Ocean

Longitude West of Paris Greenwich



SPAIN AND PORTUGAL

Scale of English Miles
0 10 20 30 40 50 60 70 80 90 100
Ancient Provinces (1:100,000)
The Modern Provinces are marked with the same
Old Towns which are distinguished thus



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ROMFORD.

ROMFORD, a busy and increasing town of England, in the county of Essex, with a large cattle market, a good corn exchange, a town-hall, two iron-foundries, and a celebrated brewery, is situated 12 miles from London by the Great Eastern Railway. It has a market-house, a parish church dating from the fifteenth century, and places of worship for Congregationalists, Baptists, Wesleyan Methodists, and Roman Catholics. Population in 1881, 7176. The name is derived from *Roman-ford*, or from a ford across the Rom, a small tributary of the Thames. It is the capital of a district known as the Liberty of Havering-atte-Bower, which comprises the parishes of Havering, Romford, and Hornchurch, and which constituted part of the demesnes of the Saxon monarchs. Peculiar privileges, arising in part from prescriptive right, and in part from a charter granted by Henry IV., and since that period frequently confirmed, belong to this district.

ROMILLY, SIR SAMUEL, a distinguished lawyer and law reformer, was born in London, 1st March, 1757. His grandfather was a French Protestant, who had quitted France in consequence of the repeal of the Edict of Nantes, and established himself as a wax-bleacher near London. Romilly was called to the bar in 1783, and on the formation of the Grenville administration at the commencement of 1806, he received the appointment of solicitor-general and the honour of knighthood, and was brought into Parliament by the government for the borough of Queenborough. In the autumn vacation of 1807 he applied himself to the consideration of the criminal law of England, which was at that time far more severe than that of any other European country—nearly 300 crimes of various degrees and qualities of moral guilt being then indiscriminately punishable with death. The necessary consequences was a great uncertainty in the execution of criminal justice, proportionately impairing its effectiveness; for, as Lord Coke long ago observed, "too severe laws are never duly executed" (3 "Inst." 163). To the removal or mitigation of this great evil Sir Samuel Romilly devoted himself with uncommon energy and perseverance during the last ten years of his life. He, however, met with opposition on every side; and although several laws of a local and special nature were repealed, and a considerable effect produced on public opinion by the repeated discussions of the subject, it was not until several years after his death that any substantial improvement was effected.

In the summer of 1818 a dissolution of Parliament took

ROMNEY.

place, and Romilly, consenting to stand for Westminster, was returned at the head of the poll, though he declined to take any part in the canvass, and did not appear upon the hustings until the termination of the election. His wife, to whom he was devotedly attached, died at Cowes in the Isle of Wight, 29th October, 1818; and this event occurring at a time when his mind was excited by recent exertions and anxiety, produced a delirium, under the influence of which he put an end to his existence, 2nd November, 1818. His "Autobiography and Correspondence," in two vols., were ably and delicately edited by his two sons, one of whom, Lord Romilly, became a distinguished Master of the Rolls.

ROMNEY, GEORGE, an English painter of much merit, was born at Dalton in Furness, in Lancashire, 26th December, 1734. He was brought up to the trade of his father as a cabinetmaker, but soon showed such a talent for carving and drawing that at the age of nineteen he was bound for four years to a portrait-painter named Steele, living at Kendal.

Here, in 1756, he contracted an early marriage, and having cancelled the indenture with his master at the age of twenty-three, commenced painting on his own account. His industry was indefatigable, and nature alone being his guide, he gradually formed for himself a simple and natural style. In the spring of 1762 he set out alone for London, where he seems to have met with considerable and early encouragement. Having taken a house in Cavendish Square, under the auspices of the Duke of Richmond, he commenced his career as a portrait-painter. Sitters of all ranks crowded to his studio, and in a few years he realized a large income. But his ambition appears to have increased with his years, and in his later days he devoted himself very ardently to higher arts. He had been to Italy in 1773, and it was then that he acquired the taste for classical art. On his return to London he rather absurdly set up a sort of rivalry with the great Reynolds. He was much encouraged. His pupil, Robinson, reckoned that in 1785 he earned £3600 by portraits alone. It was in 1783 that he first met the lovely and frail Emma Hart, famous as Lady Hamilton and as the mistress of Nelson. Romney painted her exquisite features over and over again in every conceivable attitude and garb. She quite inspired him, and with the happiest results for art, though fatally enough for poor Romney. He sent £100 to Flaxman, then studying in Rome, to purchase casts from the antique for him.

But while his ambition daily grew more boundless, and he began to plan a series of vast canvases, his faculties were rapidly declining. In the summer of 1799 he started abruptly for the north, where, in Kendal, his wife still resided, surviving the long estrangement of her husband, and in her he found an attentive and affectionate nurse, "who had never been irritated to an act of unkindness or an expression of reproach" by thirty-seven years of absence. In a little more than a year afterwards he fell suddenly into a state of utter imbecility, and lingered on until 15th November, 1802, when he died, in the sixty-sixth year of his age. See "Memoirs of Romney," by Hayley (1809).

ROMNEY, NEW, a decayed town of England, in the county of Kent, 81 miles from London, being 8 miles from the Ham Street station of the South eastern Railway. It was once a thriving member of the Cinque Ports, but, like most of them, is now some distance from the sea. This happened in Edward I's reign, during the storm which changed the bed of the Rother. Romney was, however, an important place long after it ceased to be a port; for the counts of the Cinque Ports were originally held at Shipway Cross, near Lynne, and then here. But one remains of its five churches. It has little trade, and is mainly celebrated for its sheep-fair, it being the metropolis of the Marsh district, which extends from Hythe to Rye, some 14 miles long by from 4 to 8 miles broad, where a fine hardy race of sheep is pastured. The population in 1881 was 1009.

ROMSEY, a municipal borough of England, in the county of Kent, situated on the Test, 79 miles from London by rail. It has a fine old parish church and a town-hall. The clothing trade of Romsey was once very extensive and important, but, together with that of paper-making, has entirely disappeared, and, with the exception of some small local manufactures, Romsey depends upon the rich agricultural neighbourhood for its business. Close to the town, and on the banks of the clear running Test, is Brands, where Lord Palmerston used constantly to reside. The corporation consists of four aldermen and twelve councillors, including the mayor. The population in 1881 was 4204. The town is of very ancient origin, and from its position on an island was originally called *Ursula Romanus*, since corrupted into Romsey. Its subsequent history is almost entirely that of its abbey, one of the most beautiful specimens of Early English architecture extant, supposed to have been founded by Edward the Elder for a convent of Benedictine nuns.

ROMULUS. One legend represents Romulus as connected with the royal family of Alba, and this was the story that was generally received by the Romans. The second, which connects Romulus with Æneas and the Trojans, did not become current until a comparatively late period in the history of Rome. The main features of the genuine Roman legend, as preserved in Livy and other writers, are these—

When Proas, King of Alba, died, he left two sons, Numitor and Amulius. The latter soon wrested the government from his elder brother, but fearing the descendants of his brother might take revenge on him when they grew up, he had the son of Numitor murdered, and made his daughter Rhea Silvia a priestess of Vesta, an office which obliged her to perpetual celibacy. But she became a mother by the god Mars, and brought forth twin sons, Romulus and Remus. Amulius put the mother to death, and ordered the children to be drowned in the Anio. The stream carried the cradle in which they had been placed into the Tiber, which chanced at the time to have overflowed its banks. The cradle was driven into shallow water to a wild fig-tree (*Ficus ruminalis*) at the foot of the Palatine Hill. A she-wolf heard the cries of the children, and suckled them, and a woodpecker, which was, like the

wolf, an animal sacred to Mars, brought them food. Faustulus, the herdsman of the flocks of King Amulius, found the children and carried them to his wife Acca Larentia or Lupa. Thus they grew up in the shepherd's straw hut on the Palatine. The two youths became the stoutest and bravest among their comrades, with whom they shared their booty. A quarrel one day broke out between the two brothers and the shepherds of Numitor, who held a little ground not far off. Remus was taken by a stratagem, and led to Alba before Numitor, who, struck by his appearance and the circumstances of the age of the two brothers, ordered Romulus likewise to be brought before him. Faustulus now disclosed to the young men the secret of their birth, and with the assistance of the faithful comrades who had accompanied them to Alba, they slew their great-uncle, King Amulius, and restored their grandfather Numitor to the government of Alba.

The youths resolving to found a new city on the Tiber, and on the spot of their miraculous preservation, Numitor assigned them a district extending in the direction of Alba as far as the sixth milestone, which was the frontier of the original *Agro Romanus* or Roman territory. A dispute arising between the brothers as to the site and name of the new city, it was agreed that it should be decided by augury. Romulus took his station on the Palatine and Remus on the Aventine. Remus had the first augury, and saw six vultures, but Romulus saw twelve, and his party claimed the victory. In observance of the rites customary among the Etruscans in the building of towns, Romulus yoked a bullock and a heifer to a plough with a copper ploughshare, and drew a furrow round the foot of the Palatine Hill, to mark the course of the walls and of the *pomerium*. Over the parts where he intended to build the gates (Lat. *portæ*) he carried the plough, otherwise nothing could have entered the city, for the trace of the plough was holy. The new city thus built on the Palatine was called Roma. Remus, in order to show his contempt of the rude and simple fortifications, leaped over them, and Romulus punished his insolence by putting him to death.

The population of the new city being very small, the gates were thrown open to strangers. Exiles, robbers, runaway slaves, and criminals, flocked to the city as an asylum, and found a reception. The only thing they now wanted was women, but none of the neighbouring people were willing to form matrimonial connections with the new settlers. Romulus therefore had recourse to a stratagem; he proclaimed that festive solemnities and games should be held in the city, and he invited his neighbours the Latins and Sabines to attend them with their daughters. In the midst of the solemnities some thirty females were forcibly carried off. The three nearest Latin towns, Antemnae, Caenina, and Crustumerium, now took up arms, but Romulus defeated them successively, and having slain Aeron, king of Caenina, he dedicated the first *spolia opima* to Jupiter Feretrius. The Sabines, under their king Titus Tatius, likewise made war against him, and the treachery of Tarpeia, a Roman woman, opened to them the gates of the fortress on the Capitol. [See TARPEIA.] The Sabines stormed the city, and Romulus in this emergency vowed a temple to Jupiter Stator, in order to inspire his men with courage. The battle continued with doubtful success, and was finally terminated by the Sabine women throwing themselves between the combatants, and thus restoring peace between their fathers and husbands. Romulus rewarded them for their services by the grant of various privileges, and the thirty *curiæ* were called after the names of the thirty Sabine heroines. The two nations, the Romans on the Palatine and the Sabines on the Capitoline and the Quirinal, were now united as one nation, though each continued to have its own king.

The two kings and the citizens of the two states met in the valley between the Capitoline and Palatine (Lat. *comi-*

tium), whenever it was necessary to transact business which was of importance to both nations. Tatius was killed during a national sacrifice at Lavinium, and Romulus henceforth ruled alone over the two nations.

Such are the fortunes and achievements which the old Roman legend ascribed to the founder of the city. He is said to have been taken up to heaven after a reign of thirty-seven years (716 B.C.) He was worshipped under the name of Quirinus (spear-god). For the facts which antiquaries perceive to lie beneath this fine old myth, see *ROME*, section *History*. The Romans believed it all; the fig-tree, the straw hut, &c., were religiously preserved for many centuries, and to this day wolves are kept in memory of Romulus upon the Capitol, at the charge of the city.

ROM'ULUS AUGUS'TULUS, the last Emperor of Rome of the ancient empire, was made emperor by his father Orestes, a Roman by origin, but born in Pannonia, and who had taken service with Attila, king of the Huns. After the death of Attila, Orestes went to Italy, when his great wealth raised him to the office of patrician or governor of Rome. The emperor, Julius Nepos, gave him an army to lead a campaign into Gaul. Instead of this he used it to overthrow and exile Nepos, and place his own son upon the throne (A.D. 475). But vengeance followed swiftly, for in the next year Odoacer, an old comrade with Orestes under Attila, and now king of the Ostrogoths or East Goths, conquered Orestes with the help of his own discontented mercenaries, shut him up in Pavia, and as soon as he capitulated had him executed. Romulus he allowed to live, but exiled him from Rome. Odoacer then proclaimed himself king of Italy (A.D. 476).

Thus fell the Empire of Rome—that is, the Roman Empire of the West; the eastern or Byzantine branch of the once single empire, still calling itself the Roman Empire, and acknowledged as such by Odoacer and many of his successors, continued till the taking of Constantinople in 1453.

RONCESVALLES. See *ROLAND*.

RON'DA, a Moorish city in the south of Spain, is situated in the midst of the lofty mountains of the Sierra-de-Ronda; it is 76 miles south-west from Granada, and has about 20,000 inhabitants. The city is separated into two parts by a very narrow ravine of great depth, traversed by the Guadiana, which is crossed by two bridges. One of these is a work of great boldness, springing from the banks of the river on massive stone piers, at the height of nearly 400 feet above its bed. The streets of the town are narrow, but clean. The Alameda is well shaded with trees and shrubs; the Plaza-de-Toros is built entirely of stone, and is capable of holding 9000 persons. The Alcazar, or castle, taken from the Moors by Ferdinand in 1485, and formerly one of the most extensive fortresses in all Andalusia, is now a mass of ruins, having been blown up by the French on their evacuation of Ronda during the Peninsular War. The town has some tanyards and manufactures of woollen cloths, flannels, and silk stuffs, but the inhabitants occupy themselves chiefly in farming and raising fruits and vegetables for the consumption of Gibraltar, distant about 40 miles. An annual fair, attended by merchants from almost every part of Southern Spain, is held in May for the sale of cattle, horses, sheep, and general goods. At these fairs great numbers of horses are sold to officers from Gibraltar. Ronda is a very healthy town, and is a favourite summer residence of the higher classes from Seville and Malaga.

RON'DEAU, a beautiful form of poetry, though very artificial, originally called *rondel*, as in the poems of Charles d'Orleans, many of which were written in England when he was here as a prisoner of the Black Prince. In this early form of the rondel we usually find fourteen octosyllabic lines turned on only two rhymes.

But the finished form, called *rondeau*, as fixed by Marot,

and on the authority of Voiture, is composed of thirteen verses in three divisions and on two rhymes. The first division begins with a short phrase, forming part of the first line of the poem, which phrase the poet has to use twice afterwards as a sort of motto—namely, at the end of the second division, and at the close of the poem, so that in this sense the poem has fifteen lines. The rhyme scheme, calling the rhymes *a* and *b* and the motto *m*, is generally *aabba*; *aabst*; *aabbam*. The length of the lines in the *rondeau* is left to the choice of the poet. This elasticity, under the rigid adherence to the laws of the rhyme scheme and the motto, render the *rondeau* a fascinating form of art. Although it has thirteen lines in its purest form, other writers have written it of various lengths, even as low as eight. See also, for a new English form invented, or at all events perfected, by Swinburne, the article *RONDEL*.

RON'DEL. See *RONDEAU* and *ROUNDLE*.

RON'DO, a piece of music consisting of two or more strains, in which, after finishing the second strain, the first is repeated, and again after the third, &c., the piece always returning to and concluding with the first. Its invention is often credited to Buononcini, the rival of Handel. Later a beautiful variety was given to the rondo by the introduction of elaborate episodes between the repeats. Beethoven's rondos (for instance, the superb specimen in the "Waldstein Sonata" for pianoforte) have never been surpassed. The subject of the rondos is kept in the same key throughout, but the episodes are generally, if not always, in related keys.

RON'SARD, PIERRE DE, a French poet, called by his contemporaries the "prince of poets," was born in 1524 at the chateau of La Poissonnière in the Vendômois. His father was maitre-d'hôtel to Francis I. of France. While yet a boy he was made page to Marguerite of France, who married King James V. of Scotland. Accompanying his mistress to Scotland he remained there three years, and on his return to Paris was attached (for a second time) to the household of the Duke of Orleans, who employed the poet on various missions abroad. The loss of hearing afterwards rendered him unfit for court life. He then applied himself diligently to study under Jean Daurat for some years, and gradually grouped round him six other poets, whence the movement of Ronsard is called the *Pléiade*. The seven were Ronsard, Du Bellay, Baif, Belleau, Tyard, Jodelle, and Daurat. Their aim was to raise poetry from the frivolity into which it had fallen. The best minds were then expressing themselves in Latin. Ronsard with his friends attempted to make the French muse scholarly, and offended his immediate age by the number of words he introduced from Latin and Greek. He was, however, something better than a pedant, and it is to his credit that he made a style of his own. He appears to have entered into some order of ecclesiastics, and received substantial proofs of the friendship of King Charles IX., whose rhymed epistles to Ronsard are favourable specimens of royal authorship. The poet died after prolonged ill-health at his priory of St. Cosme, near Tours, on the 27th December, 1585, in a most Christian frame of mind. Ronsard was always a royal favourite; king after king favoured him, and the favour of Charles IX. cost him the undying hatred of the Huguenots, which he had otherwise done nothing to merit. Marguerite of Savoy and Marguerite of France (Henry IV.'s queen) were both admirers of his verses; and another curiously joined pair of sovereigns may be named: these are Mary Stuart—afterwards Queen of Scots, who, when Queen of France as consort of Francis II., induced Ronsard to publish a complete edition of all his works—and her great rival, Elizabeth of England, who sent the sweet singer presents towards the close of his life.

ROOD, the Holy Cross, whether bearing (*crucifix*) or not bearing the crucified Jesus. The word is simply the

Old English *rod* (or *rode*), which even in very early times in one of its significations meant a gallows, whether of cruciform or other shape, in the same way that poets still use the word "tree." See the beautiful familiar hymn by Deau Milman—

"Bound upon th' accurs'd tree"

Rod meant many things; among them a pole, a staff, a cross, a measure, &c. The last signification has, in fact, both forms of the word in use, *Rod* ($5\frac{1}{2}$ yards) and *Roon* (40 square rods); the different spelling serving to distinguish the two measures.

The Holy Rood was rarely seen in Roman Catholic churches in its plain form, nearly always being a crucifix. It is frequently found erected over the entrance to the choir or chancel, and is then often of colossal size, forming an imposing feature in the church.

Rood loft is the name of the gallery crossing from side to side of the church, immediately above the chancel screen. As the Holy Rood was supported by it, it received its name from that office. It was also sometimes called the *holy loft*, for like reason. Organs are often placed in the rood loft in old churches, as being then useful both for choir and nave. Often, when there was no rood loft, a beam, called the *rood beam*, was thrown across the church. It was a favourite burial-place, under the shadow of the Holy Rood. Thus Chaucer—

"He leth in grave under the Rode beam"

ROOD, a measure of area, being the fourth part of an acre, and containing 40 square rods—that is, 1210 square yards.

ROOF, the covering of a house or other building. The name, in its most extended sense, embraces the external covering itself and the framework by which it is supported; but as a term in carpentry, it is limited to the carcass roof or framing.

In order to cover in a building in which the space to be spanned is greater than can be covered by single blocks of stone extending from one point of support to another, it is necessary either to have recourse to the principle of the arch, as in vaults and domes of stone or brick, or to form a framework of timber to support the covering. Roofs formed of one level plane, which are extensively used in Eastern countries, are not adapted for our rainy climate; and as the inclined plane carries up the roof to too great a height.

The best form for a simple roof is that formed of two inclined planes, one from the two opposite walls that approach nearest to each other, and meeting over the centre of the others, so as to form a ridge. This roof is called a *gable*. Properly formed planes are used, disposed as a *hipped roof*, which takes its name from the hips, or inclined planes formed by the meeting of the sides and ends. Sometimes the inclined faces are not continued upwards till they meet, but the roof is completed by a horizontal plane. Such a roof is called a *terrace* or *cut roof*, and may have two, three, or four inclined faces. A similar saving of height is frequently obtained by means of a roof in which each sloping face consists of two planes of different degrees of inclination. This form, which is denominated from its inventor a *Mansard roof*, affords more space for the formation of bedrooms in the roof than the simpler forms.

Such are the principal forms of roof used in covering simple rectangular buildings, but they require many modifications to suit irregularities of shape, or combinations of rectangular forms. Thus, in the junction of different roofs or portions of roofing at right angles with each other, there are inclined lines or *valleys*, which at the junction of two planes form hollows the reverse of hips. When two faces of a roof join, so as to form an angle similar to a valley,

but in a horizontal instead of an inclined position, the term *gutter* is applied instead of valley. A further distinction is that between roofs with dripping eaves, and those in which the water is collected in gutters. In the former case the roof projects several inches, or even feet, beyond the walls, and the water running from the roof either drops at once on the ground or is collected in troughs fixed under the margin of the eaves, and conducted by them to descending pipes. In gutter roofs the timbers do not extend to the outside of the walls; these latter being carried up as parapets, of a reduced thickness, to such a height as to conceal the roof either wholly or partially. The gutters, which may be troughs of wood covered with lead or other metal, are laid at the bottom of the slopes, just within the parapets, and have a gentle inclination (usually about an inch in 10 feet), so that the water runs freely towards the stack-pipes, which carry it down the face of the building.

The degree of slope given to the inclined faces of a roof varies according to the covering material employed, as well as to the climate. The ancient Grecian temples had very low-pitched roofs, varying from about 12 degrees to about 16 degrees, the height being from one-ninth to one-seventh of the span. In Roman buildings the inclination is somewhat greater, being usually 23 degrees or 24 degrees, or from one-fifth to two-ninths of the span. The general introduction of the pointed (or Gothic) style of architecture led to the use of very high pitched roofs, a very common proportion being that in which the length of the rafters is the same as the span, so that they form an equilateral triangle. In comparatively modern domestic architecture in this country, it has been considered desirable for the length of the rafters to be three-fourths that of the span, and an angle of 45 degrees is still considered by some to be the best pitch when plain tiles are used.

In describing the timber-work of an ordinary roof, each of the planes of which it is composed may be considered to be bounded by a frame, the parts of which have the general name of *bordering pieces*. Those which join the wall are the *wall-plates*; that at the meeting of two faces, parallel to the wall-plates, is the *ridge-piece*; and the inclined bars extending from the wall-plates to the ridge-piece are *rafters*, those which form the salient angles in hipped roofs being distinguished as *hip-rafters*. The support necessary for the external covering is given by a series of rafters or inclined bars, extending from the wall-plate to the ridge-piece, and placed parallel and equidistant. In a hipped roof the rafters near the ends, being parallel with the others, are necessarily diminished in length, extending from the wall-plate to the hip-rafter instead of the ridge-piece. All such pieces, being shorter than the length between the wall-plate and the ridge-piece, are called *jack-rafters*. Additional support is supplied by horizontal rectangular bars called *purlins*, placed under the rafters in such a manner as to divide their length into two or more equal parts, the ends of the purlins being fixed to the sides of the bordering frame. The purlins are supported by a series of bars called *principals*, placed equidistant from each other and parallel with the rafters, but with their upper face in the same plane as the lower face of the purlins. Where principals are used, their lower ends are mortised into the ends of the *tie-beam*, which stretches across the building and rests upon the wall-plates. The triangular frame formed by the two principals and a tie-beam, with any bars it may comprise for additional strength, is called a *truss*, and such frames being placed at regular intervals, the timber-work between any two of them is called a *bay of roofing*. The lower extremities of the common rafters, being elevated by this arrangement above the wall-plates, are supported by *pole-plates*, or pieces of timber parallel to the wall-plates, resting on the ends of the tie-beams. The supporting framework altogether is called a *carcass-roof*.

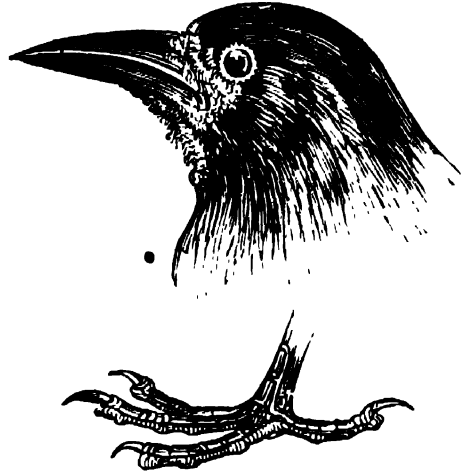
In a roof consisting simply of two inclined planes abutting on the walls, it is evident that the weight of the rafters, as well as that of the covering sustained by them, will have a tendency to thrust out the walls. This tendency ordinary walls have not the strength to resist; and therefore it becomes necessary to add a horizontal *tie-beam*, which, by receiving the outward thrust of the rafters, relieves the walls of lateral strain. As the materials are not perfectly rigid, it becomes necessary, when the timbers are of considerable length, to provide means for counteracting their tendency to sinking or *sagging*; and this is effected by adding a vertical bar called the *king-post*, by which the centre of the tie-beam may be suspended from the crown of the roof. Sometimes the king-post is dispensed with, and its office performed by two similar posts, called *queen-posts*, at equal distances from the centre of the truss. In order to keep these in their right position, a short horizontal beam, called a *collar-beam*, is inserted between their upper extremities, and another, termed a *straining-sill*, between their lower ends. *Cushion-rafters* are pieces occasionally added, in large roofs, to strengthen the principals. In curb roofs the upper rows of rafters are called *curb-rafters*, and the horizontal bars that receive the upper ends of the lower rafters and the feet of the curb-rafters, are known as *curb-plates*.

Wrought-iron straps of various forms are very useful, when judiciously applied, in strengthening the joints of a roof. Tie-beams are often suspended to the trussing-posts by means of straps, so arranged as to allow the beam to be keyed up to its true position in case of the roof sinking. When this is not the case, the ties are sometimes drawn up into a slightly convex or cambered form, to meet the same contingency. Height may be gained inside a building by so disposing the timbers that the want of a continuous tie-beam may be compensated for by an iron strap to unite the ties to the bottom of the king-post. In roofing a church with a nave and side aisles, the continuity of the tie-beams may be dispensed with, intermediate support being obtained from columns. Many of the high-pitched roofs of old Gothic churches and halls are very ingeniously contrived, but they often throw great pressure on the walls, owing to the absence or elevated position of the ties, thereby rendering very solid walls and buttresses necessary.

Thatch is a warm covering for roofs, but harbours vermin. Tiles admit heat and moisture more than good slates. Pan-tiles, having no holes for nailing through, are simply hung, by ledges, upon laths nailed to the rafters. Plain tiles, laid in mortar, and overlapping, make a very good though a very heavy covering. Slates form the most usual covering in modern houses, and are laid in various ways. In some districts laminæ of stone are used in lieu of slates or tiles. Shingles, which are like slates, but made of wood, are usually laid on boarding, in a similar manner to common slates. Sheet metal is useful for curved or flat roofs. Lead is the most common material for such purposes, though copper, iron, tinned iron, and zinc are also used. Lead terraces or flats are commonly laid on boarding or plaster. Various kinds of cement have also been used as coverings for roofs. The roof of Milan cathedral is entirely of white marble, and forms, in consequence, a promenade of great beauty. It is crowded, moreover, with hundreds of statues.

ROOK (*Corvus frugilegus*) is a well-known British species of the Crow family (Corvidæ). This species breeds in temperate Europe, resorting to the southern countries only in winter. It is a winter visitor to North-western Asia and Egypt. Like the raven and many other crows, the plumage is black, but with a rich gloss of purple and green; from the carrion-crow it is distinguished readily by having the base of the feathers gray instead of white. Pied and pure white varieties of this bird are

occasionally to be met with. The male is from 18 to 21 inches in length, the female rather smaller. A peculiarity of the rook is, that the feathers at the base of the bill and on the throat, which are present in the young birds, disappear after the first winter, and leave a rough naked skin. This peculiarity was formerly considered to be due to this bird's habit of thrusting its bill deep into the ground in search of food; but a similar result does not follow with birds of similar habits, and even when the hardness of ground prevents it from digging the face remains bare, so that it is probably a specific character of the rook. The rook differs from the carrion-crow and raven in its gregarious and social habits. It seems to prefer to build its nest in the immediate vicinity of the abodes of men; and even in the heart of London one or two pairs have frequently built their nests in a single elm tree at the corner of Wood Street and Cheapside, and a large rookery still exists in Gray's Inn Garden. The nests, of



Head and Foot of Rook.

which seven or eight are often seen on the same tree, are composed of twigs and lined with grass and roots, the same nest serves for several years. Like the raven, it breeds early in the year, commencing to repair the nest, if an old one, in February or early in March. The nest contains four or five pale greenish eggs, blotched with dark greenish-brown. The male is most attentive to the female while she is sitting, and feeds her assiduously. The food of the rook consists principally of worms, snails, slugs, and the larvæ of insects, in search of which they frequent meadows, pastures, and ploughed fields. The rook is, however, in bad odour with the farmer in spite of the number of noxious insects which it destroys, for it undoubtedly lays his corn under contribution, and devours also eggs and young birds, not excepting poultry. Walnuts form also a favourite food; and flesh, either fresh or carrion, is devoured. Near the coast it is said to rob the fishermen's nets of sand-eels and other small fish, and to have a liking for mussels, the shells of which it breaks by taking them to a height and dropping them on stones. In captivity the rook exhibits the same amusing qualities as the raven, except that its powers of imitation are more limited.

ROOT is that part of a plant which is sent downwards into the earth, at the same time that the stem is sent upwards into the air. Every part of the plant which exists under ground is not root, as large portions of the stem itself may remain under the surface of the earth; and large buds, called bulbs, also exist under ground. These parts have been often confounded with the root. The creeping root, and some forms of the tuberous and bulbous roots of

older botanical writers, are only so many different forms of the stem. See STEM.

The root is distinguished by certain structural peculiarities, by which it may be easily known from the stem. (1) Its ramifications are irregular, not having the symmetrical form of branches, nor are they developed like branches from buds. (2) Roots generally produce no leaf-buds. When they do appear, which occasionally occurs, they are called adventitious buds. (3) Roots never have leaves, scales, or other appendages developed upon their surface. (4) The cuticle of roots is never found to possess stomates, which are frequently very numerous on various parts of the stem.

The smaller divisions of roots are called *fibrils*, which consist of a little bundle of ducts or spiral vessels, surrounded by woody fibres, lying in a mass of cellular tissue. At the apex of the fibril the cellular tissue is loose and devoid of cuticle, from which cause it absorbs more rapidly the fluid by which it is surrounded than the other parts of the root.

The internal structure of the root resembles that of the stem, but in dicotyledons the roots do not possess a central pith, and the bast and wood portions alternate with one another. The cellular tissue of many roots is exceedingly abundant, and on this account they are used as articles of diet. Their nutritive property depends on the saccharine and other secretions which are deposited in the cells of the cellular tissue. Many of these roots, by attention to their culture, may be increased in size; and the growth of esculent roots is an object of importance in the kitchen-garden.

Roots are called *annual*, *biennial*, or *perennial*, according to their duration. When a root perishes after its first year's life, and flowering it is annual; if after the second year's life, and first year of flowering, it is biennial. If a root endures for many years, although its foliage may perish every year, it is perennial.

What the absorbent vessels are to the animal, the roots are to the plant, and a difference between plants and animals has been pointed out as dependent on the relative situation of the organs of absorption. The animal derives its nutriment, by means of its absorbents, from an internal reservoir, the stomach, while the plant derives its nutriment from an external reservoir, the earth. The root-hairs are the active agents in the absorption of nutritious matter from the soil.

It is by means of the roots that a plant maintains its position in the earth; and if for the increasing nourishment of the plant an increase of the absorbing surface is required, it is no less necessary that, for the purpose of maintaining its stem erect and firm, an extension of its holdfast should take place. Roots not unfrequently afford a good basis for the determination of genera. The distinctive characteristics of many are important and well marked. For example, the roots of grasses are fibrous; but in the form of the fibres.

In some cases, as in the couch grass, the fibres run into tufts. Grasses, again, planted in dry sandy places show a tendency to produce small and bulbous roots. In sedges the fibres pass into tubers and nodules according to situation. In the Cruciferae, again, the roots are generally fusiform, as in the radish, carrot, parsnip, &c. In geraniums the roots are woody and spreading.

ROOT, in music, is the name given to that note of any given chord which forms the bass-note of the chord when it is in its fundamental or root position. The various notes of a chord are always referred to their distance from the root, and the great effect of a succession of chords, which is greatly due to the easy progression of the separate parts, is still more founded upon a good relation among the various roots, and this whether the roots appear or not. But it sometimes happens that a chord is used with-

out its root being sounded, and this is invariably the case in inversions of the chord of the Ninth, and in some other similar cases where the root would make unallowable discord with the upper parts.

A large school of harmonists regard the roots of chords as being fixed by natural law, each chord being (according to them) exclusively composed of harmonics of its root. There is much to be said for this view in so far as it brings all harmony under a general law, simplifying and arranging an otherwise very incoherent mass of facts; but it can scarcely bear the test of severe analytic discussion, and should be regarded, not as a scientific, but as a practical classification. See HARMONY.

ROOT, in algebra and arithmetic, is that quantity which when raised to a given power will produce a given quantity. Thus x is the square root of x^2 (x square), because when raised to the second power or square it produces x^2 ; so also the square root of $a^2 + 2ax + x^2$ is $a + x$, because the latter when raised to the square power produces the first-named quantity. So also in arithmetic, 5 is the centre root of 125, because 5^3 (the cube of 5) = 125. Raising a root to any desired power is called **EVOLUTION**; extracting the root of any given quantity is called **EVOLUTION**. See those articles.

ROOT, in language, is the term applied to that part of a word which cannot be reduced to a simpler or more original form. Roots are *predicative* (corresponding to notional words, i.e., words expressing qualities or acts) and *demonstrative* (corresponding to relational words, i.e., words expressing time and space relations).

The root is the significative part of the word: thus, from *spin*, adding the suffix *-der*, which denotes an instrument or agent, we get *spin-der*, the spinning insect; from *bear* and the passive suffix *-n* or *-en* we get *bairn*, one who has been born. Suffixes were once independent words themselves.

The root must not be confused with the *stem* of a word, for this is itself usually a modification of the root. Thus *love* is the stem of the verb "to love," entering into all its modifications, so that *love-d*, the past tense, is made by adding *d*, the suffix expressing past time, to the stem; the root of the word, however, is *lov* (or rather *luf*, in its original Old English form).

The study of roots is therefore a most important and interesting branch of the study of language. See the article ARYAN ROOTS, for instance, and also the article LANGUAGE.

ROOT AND BRANCH BILL is the name popularly given to the Act of 1611, by which the Long Parliament excluded the bishops from the House of Lords and endeavoured to root out episcopacy altogether, a result due to the follies and crimes of Laud and the High Commission Court, which had engendered a violent hatred of episcopacy throughout the land.

ROPE and **ROPE-MAKING**. A rope is a combination of fibres of hemp, or other material, so arranged as to form a flexible and tenacious cord or band, retaining, as far as possible, their collective strength. The name rope is generally confined to the larger description of cordage, such as exceed an inch in circumference, though the principles of formation are much the same for cordage of every size.

In rope-making the first process consists in twisting the hemp into thick threads, called rope-yarns. This process, which resembles ordinary spinning, is performed with various kinds of machinery. The common mode of spinning rope-yarns by hand is performed in the rope-ground or rope-walk, an inclosed slip of level ground sometimes 600 feet or more in length. At one end of this ground a spinning-wheel is set up, which gives motion by a band to several small rollers or whirls. Each whirl has a small hook formed on the end of its axis next the

walk. Each of the spinners is provided with a bundle of dressed hemp laid round his waist, with the bight or double in front, and the ends passing each other at his back, from which he draws out a sufficient number of fibres to form a rope-yarn of the required size; and, after slightly twisting them together with his fingers, he attaches them to the hook of a whirl. The whirl being now set in motion by turning the wheel, the skin is twisted into a rope-yarn, the spinner walking backwards down the rope-walk, supporting the yarn with one hand, which is protected by a wetted piece of coarse cloth or flannel, while with the other he regulates the quantity of fibres drawn from the bundle of hemp by the revolution of the yarn. The degree of twist depends on the velocity with which the wheel is turned, combined with the retrograde pace of the spinner. When the spinner has traversed the whole length of the rope-walk (or sooner, if the yarns are not required to be so long), he calls out, and another spinner detaches the yarn from the whirl, and gives it to a person who carries it aside to a reel, while the second spinner attaches his own hemp to the whirl hook. The hemp, being dry and elastic, would instantly untwist if the yarn were now set at liberty. The first spinner therefore keeps fast hold of it all the while that the reeler winds it up, walking slowly up the walk, so as to keep the yarn equally tight all the way. When it is all wound up the spinner holds it until another is ready to follow it on the reel. Sometimes, instead of being wound on a reel as they are made, the yarns are laid together in large hooks attached to posts at the side of the walk until about 400 are collected together, when they are coiled up in a haul, or skein, in which state they are ready for tarring.

The next process is warping the yarns, or stretching them to a given length, in order that they may, when formed into a strand, bear the strain equally. When the rope is to be tarred that operation is usually performed upon the yarns immediately after their being warped, as the application of tar to the yarns previous to their combination is necessary to the complete penetration of the whole substance of the rope. The most common method of tarring the yarns is to draw them in hauls or skeins through the tar-kettle by a capstan; but sometimes the yarns are passed singly through the tar, being wound off one reel on to another, and the superfluous tar being taken off by passing the yarn through a hole surrounded with spongy oakum.

The tarring of ropes somewhat impairs their strength, but renders them more durable. Manila hemp, which withstands the influence of water much better than ordinary hemp, is now extensively used for heavy cordage, and tarring is not practised so much as formerly.

Ropes are also made by machinery. The essential feature of this plan consists in having yarns, strands, and ropes wound upon bobbins or drums in each successive stage, the material being drawn direct from the reel, to be twisted and immediately wound up again. By this means ropes can be made of almost any length.

In making large cordage, from fifteen to twenty yarns are formed into a strand, and three or more such strands are afterwards combined into a rope. The twist of the strand is in an opposite direction to that of the yarns. In closing or laying the rope three strands are stretched at length along the walk, and attached at one end to separate but contiguous hooks, and at the other to a single hook; and they are twisted together by turning the single hook in a direction contrary to that of the other three, a piece of wood called a top, in the form of a truncated cone, being placed between the strands, and kept during the whole operation gently forced into the angle formed by the strands, where they are united by the closing or twisting of the rope. As the rope shortens in closing one end only of the apparatus is fixed, the other being on a movable

sledge, whose motion up the rope-walk is capable of regulation by suitable tackle attached to it, or by loading it with weights. The top also is mounted on a sledge for closing large cordage, and its rate of motion may be retarded, in order to give greater firmness to the twist of the rope. Ropes formed in this manner are said to be shroud-laid or hawser-laid.

The largest ropes and cables, said to be cable-laid, are formed by the combination of smaller ropes twisted round their common axis, just as shroud-laid ropes are composed of strands twisted round their common axis. As cable-laid ropes are harder and more compact than others, this mode of formation is adopted for ropes to be exposed to the action of water, even though their thickness may not be very great.

Ropes formed by plaiting instead of twisting are made use of for some purposes in which pliability is especially needed, they being more supple and less liable to entanglement than those of the ordinary make. Such ropes are preferred for sash-lines, clock-lines, &c., and generally where the rope has to pass over pulleys of small diameter.

Flat ropes, which are much used for munnig purposes, are either formed of two or more small ropes placed side by side, and united by sewing, lapping, or interlacing with thread or smaller ropes, or of a number of strands of shroud-laid rope similarly united. In either case it is necessary that the component ropes or strands be alternately of a right-hand and left-hand twist, that the rope may remain in a quiescent state.

Many experiments were made by Réaumur, Knowles, and others to test the loss of strength by the ordinary twist given to ropes. Duhamel prepared the following statement to show the comparative strength of ropes formed of the same hemp and the same weight per fathom, but twisted respectively to two-thirds, three-fourths, and four-fifths of the length of their component yarns.—

Degree of Twist	Weight borne in two Experiments.		
Two-thirds, ...	1998 lbs.	...	1256 lbs.
Three-fourths, ...	1850 "	...	6753 "
Four-fifths, ...	6205 "	...	7397 "

The result of these experiments led Duhamel to try the practicability of making ropes without any twist, the yarns being wrapped round to keep them together. These had great strength but very little durability. In shroud or hawser-laid ropes the usual reduction of length by twisting is one-third; but cable-laid ropes are further shortened, so that 200 fathoms of yarn are required to make 120 fathoms of cable.

Several other kinds of vegetable fibre have been made use of in the manufacture of cordage, and some greatly exceed hemp in strength. The fibres of the aloe, long wool, hemp mixed with threads of caoutchouc, thongs of ox-hide, and several other substances, have been employed; but none are found to combine so many advantages as hemp.

Ropes formed of iron wire are found to effect a great saving of expense from their durability and superior lightness. Ropes of twisted iron wire were first used in the silver mines of the Harz Mountains in 1841; they were nearly equal in strength to solid iron bars of equal thickness, and equal to hempen ropes of four times their weight. Wire ropes are now made in England under many patents. They are formed in various ways, according to their intended use. For standing rigging straight untwisted wires are employed, bound round with cloth or small hempen cordage saturated with a solution of caoutchouc, asphaltum, or other preservative from rust. Flat ropes may likewise be made of straight wires, interwoven or wrapped with hempen yarn, or sewed between canvas, &c. The twisting should not be so hard as in hempen cordage; and all the wires must be protected by an anti-corrosive composition,

or by coating with tin, zinc, &c. It is sometimes the practice to twist wires round a core, either of wire, hemp cord, spun yarn, or other material, to form a strand; and to lay such strands round a similar core when there are more than three strands in a rope.

Steel wire ropes are now manufactured in large quantities. They can be made as flexible as the best hemp, are, as will be seen from the annexed table, three times as strong, and by using steel about two-thirds of the former weight of the cable is got rid of.

Hemp Rope.			Wire Rope			Equal to a strain of
Size. Inches.	Weight per fathom. Lbs. Oz.		Size Inches.	Weight per fathom. Lbs. Oz.		
3	2 4		1½	1 4		2 10
4	3 15		1½	1 9		3 10
5	6 0		1½	1 11		6 15
6	9 0		2	2 2		8 0
7	12 3		2½	2 9		8 11
8	14 3		2½	4 1		9 18
9	19 6		3	5 4		15 6
10	25 0		3½	7 1		24 6
11	30 0		4	11 6		29 5
12	36 8		4½	15 12		35 4

RORE, CIPRIANO DI, the more familiar Italianized name of *Cipriano Van Rore*, one of the most renowned musicians of the sixteenth century, was born at Mechlin in Flanders, 1516. In the title-page of a book published at Venice in 1549, he is called the scholar of Adrian Willaert, *maestro di cappella* at St. Marks, Venice, but a Netherlander by birth, like so many of the best musicians of the time. His first known work is a set of madrigals, published in 1542; and he wrote largely from this time onward. After having been successively *maestro di cappella* to the Duke of Ferrara, the republic of Venice, where he was the successor of Willaert, and the Duke of Parma, he died at the court of the last-named prince in 1565.

ROR'QUAL or **FIN-WHALE** (*Balenoptera*) is a genus of *CETACEA*, differing from the whalebone or true WHALES (*Balaena*) in their more elongated body, smaller head and mouth, shorter balen plates, small and narrow flippers, and especially by the presence of a dorsal fin situated behind the middle of the back. The rorquals are not much sought after by those engaged in the whale fisheries. Their balen is of little use, and they yield very little blubber in comparison with the Greenland Whale (*Balaena mysticetus*). The rorquals vary considerably in size, some reaching a length of 100 feet, and others being only about 20 feet long. They are migratory, and are found in most oceans, a few occurring on British coasts. Unlike the Greenland whale, they all feed on fish, the northern form destroying enormous numbers of herrings and cod-fish. The Common Rorqual or Razor-bill (*Balenoptera musculus*) is frequently met with on British coasts. It is usually between 60 and 70 feet long, black above and brilliant white below. The Lesser Rorqual (*Balenoptera rostrata*) is occasionally met with in British waters, but is a more northern form, being very common off the coasts of Norway in summer time, and extending far within the Arctic Ocean. It is a much smaller species, never attaining a greater length than 25 or 30 feet; it is blackish above, reddish-white below. A large species, the Sulphur-bottom Whale (*Balenoptera sulphurea*), with a yellowish belly, occurs in the Pacific Ocean. Sibbald's Rorqual (*Balenoptera sibbaldi*), abundant near the coasts of Iceland and Greenland, is another very large species; the belly is slaty-gray, spotted with white.

ROSA, SALVA TOR, was born at Renella, a village near Naples, on 20th June, 1615. When still quite a youth he devoted his whole energy to art, dividing his time between painting, music, and poetry. In 1633 he

went on a tour through the wild scenery of La Basilicata, La Puglia, and Calabria, and is said, though on slender evidence, to have occasionally associated with banditti. His vigorous drawings attracted notice, and he was enabled to visit Rome. Here he enjoyed the patronage of Cardinal Brancaccio. In 1647, on the breaking out of the revolt of Masaniello at Naples, Salvator became a member of his band. On its suppression he made his escape to Florence, in the train of the Prince Carlo Giovanni de' Medici, and was employed by the grand-duke to paint in the Pitti Palace. After remaining several years in great honour at Florence, he returned to Rome. He died of dropsy on 15th March, 1673.

Rosa possessed great invention, and had a wonderful facility of execution. He is finest when he limits his efforts to works of the easel size, and his figures are then correct in drawing and spirited in design. Of his landscapes it may be observed, that he wholly rejected the simplicity and amenity cultivated by Claude and by Poussin, and indulged in gloomy effects and romantic designs. Nor are his sea pieces less forcible; in them he represents the desolate shores of Calabria, and not unfrequently adds interest to his works by the terror of shipwreck. Salvator Rosa was also a musician and a poet and satirist of no common rank. He seems to have had a truer genius for music, as far as regards melody, than any of his contemporaries, and his verses are remarkable for strength and vigour of expression. To his other accomplishments he added architecture, and he excelled as a comic actor, an improvisatore, and a performer on various musical instruments.

ROSAEÆ is an order of *POLYPTALÆ*. The chief groups of this order are Rosaceæ, Pomaceæ, Amygdalææ, and Poteriææ.

Rosaceæ proper include the true Roses (*Rosæ*), the Cinquefoils (*Potentillæ*), the Spiræas (*Spirææ*), and the Neuradas (*Neuradæ*). They are herbaceous plants or shrubs, principally inhabitants of the temperate and cold zones of the northern hemisphere of the New and Old World; a very few are found on high land within the tropics, and a small number in the southern hemisphere. None of the plants of this section of the order are unwholesome. They are characterized by the presence of an astringent principle, which has led to the use of many of them in medicine.

Pomaceæ include the apple, pear, medlar, quince, service tree, and mountain-ash. They are inhabitants of Europe, Northern Asia, and the mountains of India and North America.

Amygdalææ, the species of which are natives exclusively of the northern hemisphere, where they are found in cold or temperate climates. Many of them are poisonous, on account of the hydrocyanic acid they contain. They yield, however, some of our most valued fruits, as the peach, nectarine, plum, apricot, cherry, and almond, which last is the seed of *Amygdalus communis*.

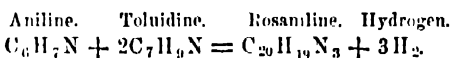
Poteriææ are found wild in heaths, hedges, and exposed places in Europe, North and South America beyond the tropics, and the Cape of Good Hope. Their principal property is astringency, and some of the species may be used as fodder.

The chief characteristics of the order are the following:—flowers generally regular; calyx lobes, five; disc clothing the tube of the calyx; petals, five, inserted under the margin of the disc; stamens indefinite; carpels one or several, free, or at length united; ovules generally two, anatropous. The species are herbs, shrubs, or trees, with stipulate leaves.

ROSAMOND (usually called *Fair Rosamond*), a daughter of Sir Walter Clifford, and mistress of Henry II. She is said to have been born at Skipton Castle, in Yorkshire. To avoid the jealousy of his queen Eleanor, Henry

is reported to have kept her in a labyrinth, or bower, at Woodstock, "so that no man or woman might come to her." During the absence of Henry from England, however, "the queen came to her by a clue of thredde, and so dealt with her that she lived not long after." She is, by some, said to have been poisoned, and to have been buried in a house of nuns at Godstow, till her ashes were removed by Hugh, bishop of Lincoln, in 1191. The legend of her death at Queen Eleanor's hand is not traceable beyond the first half of the fourteenth century, and can hardly be true in any form, as Eleanor was in confinement during the last fifteen years of Henry's reign. Rosamond Clifford is introduced by Sir Walter Scott into two of his novels, "The Talisman" and "Woodstock."

ROSANILINE is aniline red. This is known in commerce under a variety of names, as roseine, fuchsine, magenta, &c. It is a strong base, which, when quite pure, is colourless, and crystallizes in plates insoluble in water, but soluble in alcohol and ether. The formula is $C_{20}H_{19}N_3$. The salts of rosaniline are beautifully crystallized substances, having a green gold reflection, and in water they furnish an intense red solution of great tinctorial power. It is enormously used in dyeing, and forms a large article of commerce. It is usually obtained by heating dry arsenic acid with aniline, but it is remarkable that it cannot be obtained from pure aniline; it requires the presence of toluidine, which is always found in commercial aniline. The following is probably the reaction:—



By digesting rosaniline with aniline at 150° to 160° C. (300° to 320° Fahr.) aniline blue and aniline violet are obtained. Aniline blue is a salt of triphenyl-rosaniline, $C_{20}H_{16}(C_6H_5)_3N_3$. Hoffman's violet is the iodide of triethyl-rosaniline, $C_{20}H_{16}(C_2H_5)_3N_3$.

The hydrochlorate of rosaniline is much used for staining inological specimens, and it has been employed in medicine, in doses of a half to 1 grains, in albuminuria. It colours the urine red. For medicinal purposes it must be carefully purified from arsenic, with which the commercial salt is often contaminated.

ROSARIO, a flourishing town and river-port of the Argentine Republic, in the province of Santa Fé, on the Parana, 186 miles above Buenos Ayres. It is the terminus of a railway which extends westward across the republic to Mercedes, and which is being extended to Mendoza at the eastern base of the Andes. Several lines of steamers ply direct to Rosario from European and American ports, and there are several foundries, breweries, tanneries, soap works, saw mills, a fruit-preserving manufactory, and some brick-kilns. The population is about 42,000.

ROSARY. See BEADS.

ROSCELLINUS, the Latinized name of *Ruzelin*, a celebrated scholastic doctor and canon of Compiègne, was born in Brittany about the middle of the eleventh century. His name is principally known in connection with the controversy between the Nominalists and the Realists. The point on which this dispute turned was the nature or import of general notions or terms, such as *man*, *animal*, &c. It was debated with great animation, and often to the effusion of blood, throughout the middle ages—the whole scholastic philosophy being little more than an exhibition of the three rival opinions which aimed at its solution, namely, Realism, Nominalism, and Conceptualism. Realism held that ideas or general notions have some sort of reality independent of the mind which harbours them; Nominalism that the ideas in question have no reality whatever; Conceptualism that the genera and species have no reality in nature, but that there is something corresponding to them in the mind—some conception of which the general

term is the expression. Roscellinus was a strenuous advocate of Nominalism; indeed he is usually regarded as its author in its complete form as a scholastic doctrine. His adoption of this opinion exposed him to the charge of heresy; for, it was argued, if all existence be strictly particular, how can the doctrine of the Trinity, which holds the common nature of the three divine persons, be maintained? He was condemned by the Council of Soissons (1092), and sought refuge in England, where he was treated with such coldness or hostility by Anselm, archbishop of Canterbury, and the other dignitaries of the church, that he very soon returned to France, where he died probably about 1122. None of his writings are extant, but his opinions can be gathered with tolerable completeness from the works of his opponents.

ROS CIUS, QUINTUS, a celebrated Roman actor, was born near Lanuvium, but at what period is uncertain. He is frequently mentioned in the writings of Cicero, who was his friend and warm admirer. His talents also obtained for him the friendship of Sulla, who, during his dictatorship, presented him with a gold ring, the mark of equestrian rank. So perfect was Roscius in his art, that his name became almost synonymous with excellence in any other branch.

ROSCOE, WILLIAM, a historian and miscellaneous writer, was born in 1753, near Liverpool, and received a common school education. When in his sixteenth year he was apprenticed to an attorney in Liverpool, and in 1774 he was admitted to practise in the Court of King's Bench. In the meantime he wrote some poems, one of which made him known to Sir Joshua Reynolds, Fuseli, and other distinguished artists. In 1784 he was elected honorary member of the Manchester Literary and Philosophical Society. He also turned his attention to the subject of the slave trade, and wrote several pamphlets recommending its suppression, and one or two political pamphlets. In 1796 Roscoe published the "Life of Lorenzo de' Medici, called the Magnificent," a work which established his literary reputation. After many years Roscoe replied to various hostile critics, who accused him of undue partiality to Lorenzo, in pointed though temperate language, in his "Illustrations, Historical and Critical, of the life of Lorenzo de' Medici" (4to, London, 1822). The second historical work of Roscoe is his "Life and Pontificate of Leo X.," to which similar objections were also made. Considered, however, as works of erudition and of general interest, both his biographies stand deservedly high, and have often been reprinted and also translated into French, German, and Italian.

Roscoe was returned to Parliament for Liverpool in the Whig interest. In the latter part of his life he became partner in a banking house, in which, however, he was not successful. He died at Liverpool, 30th June, 1831. Roscoe's character was a fine one, and his sense of duty—both public and private—exceedingly high. He had the courage of unpopular opinions, and although ever foremost in forwarding good objects in his native town, he did not hesitate to speak out plainly when necessary, as on the question of slavery.

ROSCOMMON, an inland county in the province of Connaught in Ireland, is bounded N. and N.E. by the county of Leitrim, E. by Longford, S.E. by Westmeath, S. by King's County, S.W. by the county of Galway, W. by Mayo, and N.W. by Sligo. The form of the county is irregular. The greatest length, north to south, is 60 miles; the greatest breadth, east to west, is 40 miles. The area is 942 square miles, or 607,691 acres. The inhabitants in 1881 numbered 132,490, nearly all Roman Catholics. In 1841 the population was 233,591—a decrease of upwards of 120,000 in the forty years.

Surface, Geology, and Rivers.—The surface of the county is partly undulating, but along the banks of the

Shannon and the Suck, and in other parts, it is very flat. The principal elevations are the Braughlieve Mountains and Slieve Cuskagh (1000 to 1200 feet high); the Culew Mountains; the Slieve Bawn, 839 feet to 857 feet high; the hills between the Shannon and the Suck; and Slieve Aelwyn. The eastern side of the Slieve Bawn slopes gradually down to the bogs in the valley of the Shannon at their base; the western side is more broken.

The level parts of the county are for the most part occupied by the formations belonging to the great carboniferous limestone district of Central Ireland. The impure argillaceous limestone, the black shale, and the sandstone, which form one of the subdivisions of the limestone group, and the lower limestone, which constitutes another subdivision, subjacent to the culp, are found here. The hills west of Castlereagh are composed of the yellow sandstone, which is the lowest member of the limestone group. The Braughlieve Mountains and Slieve Cuskagh are composed of shales and sandstones, with three beds of coal resting on others of the millstone grit series, from which good ironstone is obtained. The veins of coal and ironstone have been occasionally wrought to some extent, but to the heavy loss of those by whom the works were carried on. The collieries have been abandoned as not worth the cost of working them.

The Culew Mountains and the Slieve Bawn consist of rocks of the old red sandstone formation. Good limestone is quarried for building; potter's clay and pipe-clay are found in various parts of the county.

Roscommon belongs to the basin of the SHANNON, except a very small portion at the western extremity, drained by the Moy, which flows into Killida Bay. Lough Allen, which the Shannon enters about 5 miles from its source, and through which it flows, is on the north-eastern boundary. The Suck, the only important tributary of the Shannon, rises just within the county of Mayo, but its course is almost entirely within or upon the boundary of Roscommon; its length may be estimated at more than 60 miles. Both the Shannon and the Suck are navigable. The Royal Canal opens into the Shannon opposite Tuambarry; the Grand Canal just below the junction of the Suck. The traffic on the canals consists chiefly of corn and butter sent to Dublin, and of English manufactures and general goods in return. The navigation of the Suck commences at Ballinacree (county of Galway) for light flat-bottomed boats; small row-boats ascend higher. A canal is cut parallel to it on the Galway side of the river, from Ballinacree to the Shannon.

The principal lakes are Lough Allen (8 miles long, north to south, and 3 miles broad), Lough Bodag and Lough Boffin forming one sheet of water of intricate form, 5 miles from north to south-east, and 7 miles to south-west), Lough Forbes and Lough Roe (17 miles long from north to south, and 7 miles broad), all on the Shannon; Lough Gara (5 miles long, north to south, and 5 miles broad), Lough Key, and several other smaller lakes.

Soil and Agriculture.—The soil in the limestone district is commonly fertile; there is, however, a large extent of bog and other wastes. The amount of pasture land is considerable; the natural pasture, which are esteemed to be some of the best in the county, are in the limestone districts. Rich crop lands are met with; and there are, especially along the limestone ridges between the Shannon and the Suck, extensive tracts of light shallow soil, so shallow, indeed, that in some parts the plough cannot be used. These tracts are commonly used for sheep-farming. The surface of the mountains is commonly wet and boggy, but intervening spots of dry ground covered with heath occur. Some of the soil in the sandstone districts, as in the Culew Mountains, near Boyle, is very poor, but is capable of great improvement from the addition of lime, or rather of a compost of lime and bog

earth, which is to be had readily. Much may be done in this way, as well as by draining cold wet lands, whenever capital comes to be employed more extensively than at present in agricultural improvement.

The extent of the unimproved mountains and bogs has been estimated at above 130,000 acres, the bogs being dispersed over the face of the country in patches of various size and in almost every variety of situation: they are found on the tops of the highest mountains, on the banks of the loughs and rivers, and in the bottoms of the valleys. Several of those on the uplands are comparatively dry, and afford in their natural state coarse pasturage for young and hardy cattle. Many of the estates in the county are large, and on them improved systems of agriculture have been introduced, but on the small farms everything is backward. The Midland Great Western, the Great Northern and Western, and the Sligo and Cavan railways traverse the county.

History and Antiquities.—In the earliest historical period this county appears to have been partly or wholly in possession of the Antei, a people mentioned by Ptolemy, and supposed to have inhabited some part of the counties of Galway and Roscommon.

Of the earliest period there are few memorials; the raths (hill-forts or earthworks) are the principal. Of these there are more than 470. They are always upon natural eminences. At Oran, between Roscommon and Castlereagh, is one of the round towers whose use and origin are so uncertain.

After the English invasion of Ireland Roscommon formed part of the kingdom of Connaught, and was governed by Roderic O'Connor, recognized as sovereign of Ireland. This part of the country appears to have been long in a state of anarchy, the Irish septa struggling for independence with the De Burgos, their Anglo-Norman masters. Of this troubled period there are several memorials in the ruined castles and monastic buildings which exist, the chief of which are Roscommon Castle and the abbey of Roscommon, Boyle, and Clonsilla. Between Roscommon and Castlereagh are the ruins of Ballintober Castle, the ancient stronghold of the O'Connor Dhuinne or Don. A very remarkable ruined fort of unknown antiquity is to be seen near Lough Glynn. The keep of Athlone Castle, which is yet standing, is a decagon, and is in the Roscommon part of the town. There are several remains of other castles. One of the former members of Parliament for the county—the O'Connor Don—was the lineal descendant of the ancient kings, and is one of the very few Irish princes who have succeeded to the hereditary estates of their ancestors. The county returns two members to the House of Commons.

ROSCOMMON, the capital of the above county, is situated about 25 miles south by east from Boyle, and 78 miles from Dublin on the Midland Great Western Railway. It appears to have derived its origin from an abbey founded about 550 by St. Coman or Conanus. Another abbey of greater magnificence was founded here for the order of Preaching Friars, about 1257, by O'Connor, king or prince of Connaught; and a few years after a strong castle was built by Sir Robert de Ufford, one of the early English adventurers. Of these last two edifices there are considerable remains: the castle is on the north side of the town, and the abbey on the south. Both are on level ground, while the town occupies the eastern and southern slopes of an intervening eminence. Roscommon has a Protestant church, a Catholic chapel, a market-house, a cavalry barrack, an extensive modern court-house and gaol, and an infirmary. Races are annually held in the vicinity. The houses are ill-built and scattered along the principal lines of road by which the town is approached. Markets are held every Saturday. The population in 1881 was 2117.

ROSE (*Rosa*), the name of a universally admired and cultivated genus of plants forming the type of the order **ROSACEÆ**. The characters of the genus *Rosa* are the following:—Calyx with five segments, tube fleshy and contracted above; petals five; stamens numerous, attached to the calyx and corolla; ovaries attached to the inner surface of the calyx-tube, and ripening into achenes; styles projecting beyond the mouth of the calyx-tube.

The rose was known in early times, and was as great a favourite among the nations of antiquity as it is among the moderns. It is found generally in almost every country of the northern hemisphere, both in the Old and New World; from Sweden to the north of Africa; from Kamchatka to Bengal, and from Hudson Bay to the mountains of Mexico. It is not found in South America nor in Australia.

The following is an arrangement of the genus by Lindley:—

(1) *Feroces*, with hairy, thorny branches, and smooth fruit. Of this division the hedgehog rose is most common. It is a beautiful plant, with fine showy crimson blossoms appearing early in the season.

(2) *Bracteata* have hairy fruit and branches. They belong to the class of evergreen roses. *Rosa bracteata* (the Macartney rose) is a native of China, and was introduced into this country by Lord Macartney. It is a handsome plant, flowering abundantly late in the season; but it is tender, and is best grown against a wall.

(3) *Cinnamomeæ* have long, glandless leaflets, and flowers with bracts. They include *Rosa lucida* (the bright-leaved rose), *Rosa laxa* (loose or spreading Carolina rose), and *Rosa Carolina* (the true Carolina rose), a native of the marshes of North America, and often found enlivening our shrubberies by its beautiful crimson blossoms when few other flowers are to be seen.

(4) *Pimpinellifoliæ* differ from the last in habit. They have no bracts; sepals persistent and connivent. They contain *Rosa spinosissima* (the Scotch rose), a dwarf, compact, green bush, with creeping roots. It is found native in the mountainous districts and sea-coasts of all Europe, and also in the Caucasus. It was the only rose found by Sir W. Hooker in Iceland. A great number of varieties are found in the gardens of Britain, produced from the wild plant found in the North of England and Scotland. They produce an abundance of seed, from which varieties may be easily raised. *Rosa sulphurea* (the double yellow rose) is one of the most splendid plants in the genus. It has never been known to produce single flowers. Its native country is still unknown; it was procured byCLUSIUS from some of his correspondents in the East, of whom he made inquiry concerning this plant, after having seen a model of it in some little paper gardens sent from Constantinople.

(5) *Centifoliæ* comprehend those species which have ever been most interesting to the florist, as also probably those that were earliest known. They are covered with thistles and prickles; the flowers possess bracts; the leaflets are wrinkled and sepals compound. *Rosa centifolia* is the hundred-leaved cabbage rose or Provence rose. A botanical variety, the *Rosa centifolia muscosa*, is the parent of the beautiful family of moss roses. When it was produced or discovered is not known, but that it is nothing more than a variety is proved by the fact that plain and moss roses are often seen on the same bush. When moss roses are removed from our northern climate to Italy the mossiness disappears. They are universal favourites, and between twenty and thirty garden kinds of almost all colours, from white to a dark rich crimson, are enumerated. *Rosa Gallica* is the French rose. The spotted, striped, and marbled roses belong to this species. The York and Lancaster rose is a variety possessing white and red-coloured flowers. *Rosa Damascena* (the

damask rose) is supposed to have been originally brought from Damascus, and to be a native of Syria. It is much cultivated in gardens, and has not fewer varieties than the last two. The blossoms are exceedingly fragrant.

(6) *Villosæ* have erect root-shoots; nearly straight prickles; sepals persistent and connivent. *Rosa alba* (white rose) has very large flowers, exhaling a delicious fragrance. *Rosa Hibernica* (the Irish rose) belongs to this division.

(7) *Rubiginosæ* have unequal prickles, leaflets with glands, persistent sepals, and arched root-shoots. The *Eglantine* or sweetbriar is common in Britain in bushy places on a dry gravelly soil.

(8) *Caniæ* have equal hooked prickles, oval leaflets without glands, and deciduous sepals. They comprehend many of the varieties called autumnal or perpetual roses, on account of their blooming late in the season and continuing in flower a long time. Most of them are highly fragrant, and more so in the later than the earlier months of the year. The soil in which they are grown cannot be too rich. In order to secure full blossoms in the autumn all the flower-buds should be cut off in June, the shoots shortened, and the plants well watered and manured. They should never be planted on dry lawns, and wherever placed they should be manured every year. By retarding and forcing them these roses may be made to blossom eight months in the year. Of the roses in this group that have afforded varieties for the garden the *Rosa Indica* (Chinese rose) stands first. The Bourbon Rose (*Rosa Bourboniana*) is a natural hybrid between *Rosa Indica* and a variety called Red Four-seasons. This hybrid was found among a number of the latter plants in a hedge in the Isle of Bourbon. It was brought to Paris, and has since produced many beautiful varieties. The flowers of this rose are very handsome, pendulous, with fine colours, and a most delicious fragrance. The Noisette Rose was grown from seeds produced from *Rosa moschata*, fertilized with *Rosa Indica*. It was first reared in America. *Rosa Laurenciana* (the miniature or Lawrence rose) belongs to this division. Some of these little "fairy roses" produce blossoms when they are not more than 6 inches high. In cultivation they will not bear moisture, requiring in most soils a very dry, warm, raised border. They form elegant ornaments for the drawing-room. *Rosa canina* (the dog-rose) is one of the most common species of the division in this country.

(9) *Sylvestræ*, with styles coherent and stipules adnate. *Rosa arvensis* (the field or white dog-rose) belongs to this group. It is a very common plant in many parts of England, adorning the hedges with its elegant snowy blossoms. The varieties of this and allied species, as *Rosa multiflora* and *Rosa sempervirens*, produce the climbing roses of the garden, of which there are a great number now to be had. *Rosa moschata* (the musk rose) is one of the oldest inhabitants of our gardens. It is an autumnal rose, and is very generally cultivated on account of the beautiful musk scent of its flowers. It is a tender plant, and our winters are generally too severe for it. Its bunches of flowers are frequently very large, requiring props for their support. The musky odour is most powerful at night. It is supposed to be the famous rose of Persia, in the branches of which the poets of that country delight to describe the bulbul (nightingale) as pouring forth her music.

(10) *Banksianæ*, with climbing stems; leaves with three shining leaflets and nearly free subulate stipules. The most remarkable species in this group is the *Rosa Banksie* (Banksian rose). It is a native of China, and has very numerous double sweet-scented nodding flowers.

The rose is more frequently cultivated as an ornament than for its applications to medicines or the arts. It has, however, astringent and tonic properties which render it useful in medicine. In the East it is extensively grown

for the purpose of procuring, in a variety of ways, the volatile oil which gives it its delicious fragrance. For these purposes the species that are mostly cultivated are *Rosa moschata*, *Rosa centifolia*, and *Rosa Damascena*, from all of which the attar, otto, essence, or oil of roses may be procured in considerable quantities. The attar of roses forms an object of considerable commercial importance on the coast of Barbary, in Syria, Persia, India, and various parts of the East. Many other perfumes are made from roses, and are consumed in large quantities, as rose-water, vinegar of roses, spirit of roses, honey of roses, &c. See **ATTAR**.

ROSE, THE GOLDEN. See **GOLDEN ROSE**.

ROSECHAFER or **ROSE BEETLE** (Cetoniinae) is a subfamily of beetles belonging to the group LAMILLICORNIA, and family SCARABAEIDAE. The Cetoniinae form one of the most extensive families of beetles, and nothing can exceed the brilliant colours with which many of them are adorned, in this respect vying with, if not surpassing, the Buprestidae. In the larva and imago state these insects feed upon vegetable substances. The larva, when about to assume the pupa state, incloses itself in a cocoon made of particles of earth or rotten wood, fastened together



Compsocephalus Horsfieldianus.

by means of a glutinous secretion. The Cetoniinae are distinguished by their oblong, somewhat flattened body, their large triangular scutellum, and by the elytra not covering the top of the abdomen, usually the side pieces of the mesosternum protrude between the prothorax and the elytra in such a way as to cause the latter to remain closed in flight. Over 1200 species have been described, the majority, and those the largest and finest, from tropical Asia and Africa.

The Common Rosechafer (*Cetonia aurata*) is common in the southern counties of England. It is frequently to be seen on the rose trees of our gardens, its fine emerald-green colour contrasting agreeably with the delicate tints of the petals of the queen of flowers. The larvae are generally found among the decayed portions of wood, &c., at the foot of trees, but they are occasionally seen in ants' nests. At the approach of winter they penetrate 2 or 3 feet into the ground, but do not acquire their full size till about three years have elapsed. They then form a cocoon, made wholly of chips of wood and other materials around

them, which they glue together by means of a gummy liquid that they secrete from themselves. In the summer they come forth in the perfect form. The GOLIATH BEETLES (Goliathus) are very large beetles belonging to this group, found chiefly in tropical Africa. The species figured to illustrate the group is a native of Abyssinia.

ROSEINE. See **ROSANILINE**.

ROSEMARY (*Rosmarinus*) a genus of plants belonging to the order LABIATÆ. *Rosmarinus officinalis* (the common rosemary) is a very desirable plant for the garden, both on account of its evergreen character and its flowers, which appear from January to April. There are three varieties known in gardens, the green or common, the gold-striped, and the silver-striped, which are distinguished principally by the colour of their leaves. The green variety is the hardiest, and is most generally used. It may be propagated by seeds or slips or cuttings of the young shoots. The striped varieties may be best propagated by layers of the young wood. They should be planted in a warm situation, as they are much more tender than the green. They are only cultivated as ornamental plants on account of their variegated leaves.

Rosemary must not be confounded with *Icdum palustre* (or wild marsh-rosemary), which has very different and even dangerous properties. Genuine rosemary is a shrub, a native of the Mediterranean region. The official part is the tops or upper parts of the twigs.

Rosemary possesses valuable stimulant and carminative properties, but it is chiefly employed as a perfume, entering into the composition of the once celebrated Hungary water, eau de Cologne, and aromatic vinegar.

ROSEMARY, OIL OF. This fragrant volatile oil is obtained from the fresh plants of *Rosmarinus officinalis*, natural order Labiatæ, by distillation with water. It is a colourless oil, having the specific gravity of 0.90. It boils at 166° C. (330° Fahr.), and it enters into the composition of Hungary water, and is much used in perfumery, also in lotions and washes for the hair and to prevent baldness. It is a gentle stimulant and carminative, and an ancient remedy for headache. The admired flavour of Napoléon honey is due to this volatile oil, as it is ascribed to the bees feeding on the flowers of rosemary.

ROSE-NOBLE, a gold coin (later on also called *Ryal*) introduced by Edward IV. He first struck a few nobles of the old type, used ever since Edward III., showing the king standing in a ship, with the legend "IHS (Jesus) autem transiens per medium illorum ibat," whose origin is at present inexplicable. This phrase was always a favourite one, and was used as a charm against thieves, but that seems to have no obvious connection with coinage. In weight the noble was exactly equal to the modern sovereign, whose ancestor it may therefore be considered, weighing 120 grains. In value it was made equal to half a mark (a money of account), i.e. 80 silver pence English of that date. It was the finest coin in Europe of that date, and was made of very pure gold. The alterations of Edward IV. were to substitute a sun for the cross on the reverse, and a York rose on the side of the ship on the obverse, whence the name *rose-noble*. The value had risen in consequence of the rise of gold, and the rose-nobles of 120 grains were therefore worth 120 pence, instead of 80 silver pence of the period. This necessitated a new gold piece of the old value, and as the obverse bore St. Michael overcoming Satan, the new coin of 80 pence in value was called the *angel-noble*, or for shortness *angel*.

"They have in England
A coin that bears the figure of an angel."

—Shakspeare, "Merchant of Venice," II. 7.

ROSEOLA or **ROSE RASH**, sometimes known as *false measles*, resembles the eruption of measles, but it is not infectious or contagious, and there is no cough or

watering at the eyes and nostrils. It is caused by feverish excitement resulting from heat and exhaustion; hence it is frequently epidemic in hot weather. Its characteristic symptom is the appearance on the skin of a rose-coloured rash more or less suffused, or gathered into blotches, which spread by the circumference, and form rings. Sometimes the throat is affected slightly, being sore and red inside, and a little swollen externally. The rash has a course of four or five days or a week, being bright red at first, and afterwards fading and disappearing without causing any exfoliation of the skin. As a rule it appears first upon the head, from whence it travels downward to the trunk of the body, and it is last seen upon the arms and legs. It requires but little treatment beyond securing rest and the free action of the bowels by suitable salines. Any irritation of the skin may be alleviated by the use of olive oil or vaseline.

Various maladies also give rise to a roseola, perhaps the most important being secondary syphilis, of which it is one of the earliest of the constitutional symptoms. It occasionally precedes the eruption of small-pox, and it has also been noticed in association with rheumatism, gout, and cholera. In these cases the rash forms but a minor symptom of a serious disease, and it is to the latter that medical treatment must be directed.

ROSE-RYAL, another name for the double ryal used in James I.'s reign, and equal to the sovereign in value (then worth 30s.)

ROSES, WARS OF THE. White and red roses were the well-known historical emblems adopted by the respective partisans of the houses of York and Lancaster, and worn by them in the long and sanguinary wars which desolated England during the reigns of Henry VI. and Edward IV., and which were only terminated by the victory of the Lancastrian Henry Tudor, earl of Richmond, at Bosworth Field, over Richard III. in 1485. The victor represented both houses, having married the eldest daughter of Edward IV., and adopted a peculiar party-coloured red and white rose (the Tudor rose) as his badge. See the articles under the kings named.

ROSETTA or **EL RASCH'ID**, a town of Lower Egypt, is situated on the left bank of one of the principal branches of the Nile, and about 4 miles from its mouth. It is said to have been built by the son of Haroun-al-Raschid, about 875; but it did not become a place of any note till after the decline of Damietta. It then became one of the most important commercial towns in the country, and had a population of 25,000; but since the opening of the canal from Alexandria to the Nile in 1819, Rosetta has sunk into comparative insignificance, and its population has dwindled down to about 5000. The town is in a salubrious spot, and attracts many summer visitors. It contains several large mosques. The principal streets, which are very narrow, run parallel to the river. Along its left bank there is a wide promenade. The houses, which are built of a dingy red brick, are two or three storeys high. The port, though tolerably secure within, is difficult of entrance, and the passage of the bar at the mouth of the Nile is always attended with some danger, as the sands are constantly shifting and the surf is high. The country around has a very pleasing appearance, being completely embosomed in a grove of date, banana, sycamore, and other trees.

ROSETTA STONE is the name given to a stone in the British Museum, which was found by the French in 1799 among the ruins of Fort St. Julien, near the Rosetta mouth of the Nile. It was delivered up to the British on the capitulation of Alexandria, and was brought to England in 1802, and is now in the British Museum. This stone, which is a piece of black basalt, contains parts of three inscriptions: the highest on the stone is in hieroglyphics; the second is in that character commonly named

the "enchorial," or "the characters of the country;" and the third, which is in Greek, declares at the end that the decree which this stone contains was cut in three different characters, the "sacred characters," "those of the country" or the "enchorial," and the "Greek." In its present state the stone is much mutilated, chiefly at the top and at the right side. The Greek text states that the inscription was made in the reign of Ptolemy V. (Epiphanes), who became king of Egypt about 200 years before Christ. It was from the inscriptions on this stone that Young and Champollion discovered the hieroglyphic language of ancient Egypt.

ROSE-WINDOW or **WHEEL-WINDOW**, a large circular window much favoured in gables of Gothic church architecture, divided by curved mullions differing in design as the architecture is of the geometrical or the florid type. The most beautiful rose-windows are of the latter period.

ROSEWOOD, a variety of timber so called from its peculiar colour, and which, on account of its beauty, is much used in ornamental furniture. There are several kinds. The best is produced by species of the South American Dalbergia, and inferior sorts are obtained from some species of Pterocarpus. The best Indian rosewood is that of *Dalbergia latifolia*, a native of Malabar, which grows to the height of about 50 feet. When being worked it gives forth a fragrant odour, and burns readily with a smoky flame.

ROSEWOOD, OIL OF, or Oil of Rhodium, a fragrant volatile oil obtained from rosewood, *Dalbergia nigra*, and other species, by distillation with water. It is a yellow viscid oil, having a specific gravity of 0.9064. It has an odour of roses mixed with sandal-wood. It has been used for adulterating otto of roses, and is employed for its attractive odour by horse-tamers and rat-catchers.

ROSICRUCIANS is the name of a celebrated, but entirely fabulous, secret society which became first known to the public in the seventeenth century by means of several publications which have been attributed to Johann Valentin Andrea, a German scholar, born at Hertenberg, in the duchy of Wurttemberg, in 1586. In one of these works, entitled "Fama Fraternitatis des loblichen Ordens des Rosenkreuzes" (Frankfurt, 1617), there is a story of a certain Christian Rosenkreuz, a German noble of the fourteenth century, who, after travelling long in the East, returned to Germany, and there established, under certain regulations, a fraternity or secret society, of a few adepts, living together in a building which he had raised under the name of Sancti Spiritus. Here he died at 106 years of age. The place of his burial was kept a profound secret by the adepts, and the society renewed itself by the admission of successive new members in silence and obscurity, according to the strict injunction of its founder, who directed the following inscription to be placed on a door of Sancti Spiritus:—"Post CXX. annos patebo." The society was stated to be possessed of many secret gifts of knowledge, of which gold-making was one of the least. Andrea in another work, "Confessio Fraternitatis Rosæ Crucis ad Eruditos Europæ," stated that the order did not interfere with the religion or polity of states, but only sought for the true philosophy, and that one of its chief aims was the gratuitous healing of the sick. It is now known that these works were a kind of elaborate joke, and that no such society as the Rosicrucians ever existed. A large controversial literature, however, sprang up on the subject, and the name and fame of the Rosicrucians have been made use of from time to time by such impostors as Cagliostro.

ROSLIN SANDSTONE, a deposit of thick-bedded sandstones, with intermingled shales, occurring in the Scotch coal-field, and representing the Millstone Grit of more southern areas. It attains a maximum thickness of 400 feet, and is typically developed in the neighbourhood of Roslin, to the south of Edinburgh, whence the name.

ROSOLIC ACID, an acid derived from phenol by oxidation in the presence of alkalis. It is obtained from the residue left in distilling crude coal-tar oil. It is a weak acid, forming dark red compounds with the alkalis; these solutions are easily decomposed, and lose their colour on exposure to the air. It is a red powder with a greenish lustre; it dissolves in alcohol and ether with a yellow colour. The formula is $C_{20}H_{14}O_4$. When boiled with aniline and benzoic acid it yields a fine blue permanent dye.

ROSS, a market-town of England, in the county of Hereford, finely situated on an eminence above the river Wye, is about 14 miles S.S.E. from Hereford, and 132 from London by the Great Western Railway. The church is a handsome and spacious structure, with a lofty spire, founded by Robert Bevan, bishop of Hereford, in the twelfth century. It was restored in 1863-65. There are five places of worship for dissenters, a corn exchange, free library, an almshouse, a dispensary, and other benevolent institutions. The town has risen in favour as a summer resort and temporary residence, and some excellent houses have been built. The population in 1881 was 4786. The cider of the vicinity is in high repute. Pope's lines on the "Man of Ross" have rendered the name of this place familiar to students of English literature. The hero was John Kyrle, a resident during the reigns of William III., Anne, and George I. The splendid culchurn of the poet really did not go beyond his merits. He expended his time and income in promoting objects of public utility and benevolence by which the town continues to be benefited. After visiting the house in which he lived, Coleridge wrote the lines beginning—

"Richer than misers o'er their countless hoards."

ROSS and CROMARTY SHIRES, two Scotch counties, intimately connected both locally and otherwise, and treated in the census of 1861 as one county. The county of Ross comprehends a considerable area on the mainland of Scotland, together with the large island of Lewis, one of the Hebrides; and Cromarty is composed of a number of detached portions, either interspersed among the inland parts of Ross or lying along its border. The northern side of the mainland of the two counties is for the most part continuous with Sutherlandshire, extending about 60 miles from Tarbet Ness, on the eastern side of Scotland, to Loch Eiland on the western side. Invernessshire and the Moray or Murray Frith form the boundary on the S. and S.W. The Frith of Cromarty penetrates 10 miles inland from the Moray Frith, forming a long narrow inlet, little more than 2 miles wide in the broadest part. The western boundary, fenced by the coast of the Atlantic, is characterized by bold headlands separated from each other by deep but generally narrow inlets or coves. There are several small islands off this coast. The island of Lewis is north-west of the mainland part of the county, the nearest distance across the Minch, or Inverness Channel, being about 25 miles. Lewis is not strictly speaking an island of itself; it forms the northern and by far the larger portion of the principal island of the Hebrides, sometimes called the Long Island; the southern portion called Harris, belongs to Invernessshire. Lewis is 39 miles long, north to south, and 31 miles broad, east to west. The area of the two counties is 3129 square miles, or 2,003,005 acres. The population in 1881 was 78,547—37,027 males and 41,520 females.

Surface and Rivers.—With the exception of the two peninsulas formed by the three friths, Dornoch, Cromarty, and Moray, and the parts immediately adjacent to them, Ross and Cromarty consist of mountains irregularly grouped, with deep intervening glens or ravines. The principal elevations are Carn Eige, 3877 feet; Mam Soul, 3862 feet; An Aonachan, 3696 feet; Sgurr Mor, 3657 feet; Kea Cloch, 3600 feet; Ben Dearg, 3550 feet; Ben Wyvis,

3429 feet; and Foin Bhein, 2797 feet. Except the level strips of old red sandstone, about 10 miles wide upon the east coast, the surface of the united county is a rugged and mountainous tract of granite and mica slate rocks, pierced by several straths (as Strathpeffer, Strathgarve, &c.), and fit only for sheep pasture, which is gradually displacing the small native holdings.

The two counties have no large rivers. The Oikel rises at the foot of Ben Mhor in Sutherlandshire, and flows for 26 miles along the border of Sutherlandshire and Ross-shire till it unites with a stream from Loch Shin in Sutherlandshire. It then expands into a narrow lake 5 miles long, called the Kyle, which opens into Dornoch Frith. The Repath Water and Carron Water are one stream, 24 miles long, which joins the Kyle at its lower end. A number of streams flowing eastward unite above Dingwall, just below which they fall into Cromarty Frith. There are numerous lochs, or inland lakes, of which Loch Maree, the largest, is 12 miles long and about 2 miles wide. The lakes cover 57,000 acres. The inlets from the sea, also called lochs, are very numerous.

Soil and Agriculture.—The arable land of the two counties is almost entirely confined to the eastern part, comprehending the two peninsulas, the Black Isle, between Loch Beauly and Cromarty Frith, and Easter Ross, between the Cromarty Frith and Dornoch Frith, together with the comparatively low and level tract immediately adjacent to these. The central and western districts are wild, rugged, and mountainous, interspersed with lakes and narrow glens that afford pasture for sheep and black cattle. Since the commencement of the present century agriculture has been much improved. The soil in the peninsula of the Black Isle is various, and much of it poor. The cultivated portion consists chiefly of clayey loam, good black mould, and sandy loam. In Easter Ross there is a considerable extent of clayey loam and light sandy soil. The grain produced is of a superior quality. The houses of the principal farmers are neat and commodious, and the cottages of the peasantry have been greatly improved. Much of the progress in agriculture is to be ascribed to the improved communications formed and maintained by the government commission for Highland roads and bridges.

The original native breed of cattle is hardy and compact, adapted to the climate, but in the western parts of the county the Skye and Argyleshire breeds are most prevalent. Sheep-farming, however, engrosses almost the whole attention of the principal farmers, but it is not so prosperous as formerly. Deer are tolerably numerous in some places. The fox, badger, polecat, weasel, and marten are common; as are the eagle, raven, and a variety of hawks and owls. Grouse are stated to be diminishing.

There are stone quarries in some parts of the two counties, but they are comparatively unimportant. There is limestone, but no coal.

Fishing is extensively carried on at Stornoway in the Lewis, Loch Carron on the south-west, Loch Broom on the north-west, and Cromarty on the east. Altogether about 10,000 men and boys are employed in the boats during the season, and about an equal number as fishcurers, coopers, &c. The manufactures are unimportant. The Highland and Sutherland and the Dingwall and Skye railways traverse the county.

The two counties are divided into thirty-three parishes, which are comprehended in the five presbyteries of Tain, Dingwall, Chanonry (i.e. Fortrose), Lochcarron, and Lewis. The two counties unite in returning one member to Parliament. DINGWALL is the county town.

History and Antiquities.—At the earliest historical period this county appears to have been inhabited, the western part by the Creones, the eastern by the Cantani and the centre by the Caledonii of Ptolemy; but it is impossible to assign the limits of their respective territories.

Subsequently Ross became an earldom, which was united with the lordship of the Isles (*i.e.* the Western Isles) by the marriage of Donald McDonald, the lord of the Isles, with the daughter of the Earl of Ross. In 1476 the Earl of Ross was deprived of his possessions, which were all annexed to the crown, for rebellion against King Robert III. He was in return created a peer of Parliament with the title of John de Isla, lord of the Isles. During this period Ross gave title to a bishopric, erected by David I., king of Scotland; the cathedral was at Fortrose.

ROSS, ADMIRAL SIR JOHN, a distinguished Arctic navigator, was born at Balauroch, Wigtownshire, Scotland, in 1777. He entered the navy in 1790, received his commission as lieutenant in 1805, and attained the rank of commander in 1812, during which period he distinguished himself by many valuable services. In 1808 a pension was granted him in consideration of the wounds he received when cutting out a Spanish vessel from under the batteries of Bilbao. In 1818 he received a commission, as commander of the *Isabella* (in company with Lieutenant Parry of the *Alexander*), "to ascertain the existence or non-existence of a north-west passage in the Arctic regions." He undertook the voyage, and penetrated as far as Lancaster Sound. After making some useful explorations he returned, but without having succeeded in the main object of his expedition. In 1829, having been advanced to the rank of post-captain, he undertook a second voyage in search of the North-west Passage, at the expense of Sir Felix Booth, sheriff of London. His vessel was named the *Victory*, and it was attended by a smaller one of 16 tons burden, supplied by the government. He succeeded in entering Prince Regent's Inlet; but in October the vessels were frozen up in Felix Harbour, on the west side of the Gulf of Boothia. The expedition was equally unfortunate during the two succeeding winters, and in May, 1832, the vessels were abandoned. In August, 1833, the ice fortunately broke, and the crew were enabled to sail in boats. When near the entrance of Lancaster Sound they descried Ross's old ship the *Isabella*, and in this vessel they reached Hull on the 19th of September, 1833. In 1834 Sir John Ross received the honour of knighthood, and a gift of £5000 from Parliament. In 1835 he published an interesting narrative of his voyage and of his long residence in the Arctic regions, with some notices of the discovery of the Northern Magnetic Pole by his nephew. In 1850 he went out in search of Sir John Franklin, but was unsuccessful in his object. He died in London in 1856.

ROSS, SIR JAMES, nephew of the above, was born in London in 1800, and entered the navy in 1812. He accompanied his uncle in his first voyage in search of the North-west Passage, and from 1819 to 1825 was engaged with Parry in his voyages. He served under his uncle from 1829 to 1833, and commanded the expedition in the *Erabus* and *Terror* to the Antarctic seas from 1839 to 1843. On his return he was knighted, and in 1847 he published "A Voyage of Discovery and Research in the Southern and Antarctic Regions during the years 1839-43." Afterwards, in 1848-49, he commanded an expedition in search of Sir John Franklin, but was compelled, after rather more than a year's absence, during the greater part of which his vessels were shut in by the ice, to return to England without having accomplished his object. He died at Aylesbury in April, 1862. See POLAR REGIONS.

ROSS, NEW. See NEW ROSS.

ROSS/BACH, a village in the government of Merseburg, Prussian Saxony, 8 miles south-west of Merseburg, is famous for the victory gained here by the Prussians, under Frederick the Great, over the combined French and imperialist armies, under the Prince de Soubise. The Prussians numbered only 22,000; the allies, 60,000; but the latter were totally defeated (5th November, 1757), with a loss of 1200 killed and 6000 taken prisoners.

ROSSE, WILLIAM PARSONS, EARL OF, one of the most eminent practical astronomers of recent times, was born on the 17th of June, 1800. During the lifetime of his father he was known as Lord Oxmantown, and represented King's County, in which the family estates are situated, from 1821 to 1834. Retiring from Parliament in the latter year, he afterwards devoted his time to the, to him, much more congenial field of astronomical research, and for this purpose he personally superintended the construction, on his estate at Parsonstown, of the celebrated reflecting telescope which bears his name, and which obtained for him a world-wide reputation. The instrument was commenced in 1828 and completed in 1842 at a cost of £30,000. Up to that time it was the largest and most perfect instrument of the kind ever made: the mirror is a circular disc of metal weighing 4 tons. Notwithstanding the size of the instrument, however, no work can be imagined of more exquisite delicacy, and his success in overcoming the difficulties which arose at every step was a marvel of patient ingenuity. The value of the discoveries which his great instrument enabled him to make in the observation of nebulae was universally acknowledged. Established theories were dispelled by the light which he threw upon them, and new acquisitions of knowledge made to stimulate to further inquiry. All the learned societies of Europe vied in doing him honour. In 1849 he was elected president of the Royal Society. The University of Cambridge conferred upon him the degree of LL.D. He was elected a member of the Imperial Academy at St. Petersburg, and was created a knight of the Legion of Honour by the Emperor of the French, and a knight of St. Patrick by the Queen. He died 31st October, 1867, in the sixty-eighth year of his age.

ROSSELLI, COSIMO, a name of some importance in the history of art, was a Florentine painter, pupil of Masaccio, and master of Piero di Cosimo. Cosimo Rosselli worked in the Sistine Chapel, and his frescoes of the "Sermon on the Mount" and the "Last Supper" still adorn those famous walls. Other subjects in the Sistine frescoes by Rosselli are—"Moses reading the Law," and "Pharaoh drowned in the Red Sea." As his competitors here are Perugino, Botticelli, and Signorelli, the high rank of Rosselli is at once seen. He had much influence upon the painters of his time. There is a "St. Jerome" by him of good merit in the National Gallery. His tendency was to use too much gilding in his pictures. He was born in 1439, and died in 1507.

ROSSETTI, DANTE GABRIEL, an English painter, one of the original "pre-Raphaelite brethren," was born in London in 1828. His father was Gabriele Rossetti, LL.D., professor of Italian in King's College, London, and well known as a commentator on Dante, and under his care young Rossetti received an ex-

cellent leaning towards art he was in due time entered as a student at the Royal Academy, and whilst there is understood to have originated, in conjunction with his fellow-students Hunt and Millais, that effort to revive what they considered to be the purer, more earnest, and more devotional practice of art of the Italian painters who preceded Raffaele, which is now so well known as PRE-RAPHAELISM. Rossetti was the leader in this movement, and supported it with his pen in the *Academy*, as well as with his pencil, but from his habit of not sending his pictures to exhibitions he remained comparatively unknown to the public, though highly esteemed by a circle of warm admirers. On the whole he appears to have remained most faithful to the original creed. He delights in the symbolical treatment of religious subjects—returning to the last the dry quaint forms, the intense expression, strong positive colours, and minute finish which characterized his first works. His earliest picture in this manner was "The Girlhood of the Virgin Mary" (1849), the only picture (save

one other) that he ever exhibited. Rossetti made a few drawings on wood for an illustrated edition of Tennyson's poems, and one or two to a little volume of verse written by his sister Christina, whose poetical power is but little inferior to his own. His brother William has done much good work as a critic and as an editor of standard authors. Rossetti also appeared with distinguished success as a poet. "The Early Italian Poets, from Cunillo d'Alcamo to Dante Alighieri (1100-1200-1300), in the original metres, together with Dante's 'Vita Nuova,' translated by D. G. Rossetti" (8vo, 1862), is a work of learning, research, and poetic feeling, and shows a remarkable command of forms of metre unfamiliar to the English language. In 1870 he published a volume of most remarkable original poems. This volume had indeed a perfectly unique history. Rossetti married a favourite pupil, and was passionately fond of his wife. After only two years of marriage Mrs. Rossetti died in February, 1862, of an overdose of opiate, taken to alleviate pain. In the first wild despair of grief, Rossetti took the little manuscript volume containing the only copy of his poems, and had it in his wife's coffin to be buried with her, and there, in the grave at Highgate Cemetery, it lay for more than seven years, till Rossetti repented of his impulsive sorrow, and his own inclination being strengthened by the importunity of his friends, had the vault opened and the volume exhumed. When the poems were ultimately published in 1870, they met with an enthusiastic reception. Then publication led to a more embittered controversy, which will for long be memorable in the history of English literature. Rossetti and his followers were attacked (especially by the poet Robert Buchanan) as the "Fleshly School," although Rossetti's writings, passionate as they are, are certainly not truly liable to that epithet. His nervous temperament struck under the pain of misunderstanding, and it was many years before his friends could induce him to write again. Finally, he composed a few more sonnets and some remarkable ballads, which were published in 1881. Mr. Buchanan in later years endeavoured, by merely recantation, to undo the evil he had wrought by ferret and most keen judgment.

Rossetti, great and original as he was, both as a poet and painter, though intensely appreciated by those who feel with him, can never become generally popular to the non-mystical and uninitiated. The one unvarying type of female beauty—with matted masses of hair shading eyes full of love—his "Lily," "Fairy," and "Fairy," protruding upper lip, and lower lip retracted as by in-drawn sighing; long crane-neck, and generally an expression of feeble and morbid rather than healthy "potencies of passion"—will indeed always be an offence to many. As a colourist, the artist presents perhaps the truest claim to admiration. He has been compared to Turner; but seeing that the English artists' works have none of the robust vigour of colour and effect, without a trace, too, of the free, decisive handling of that mighty master of both form and colour, the comparison is most unfortunate. Rossetti had undoubtedly the peculiar "personality" of genius, hence his influence on contemporaries; but in art his works rather suggest possibilities than assert them; his actual achievements of colour and general acceptance. His avowed object was to reach, through art, the forgotten world of old religions, revelations, mysticism, and symbolism, uniting as elements in the formation of spiritual beauty. This the older painters also aimed at, but were hindered of achieving by want of that skill and beauty which Raphael, who possessed them in all their splendour, elevated from means to ends—to the ruin (as Rossetti thought) of all true art.

For many years before his death Rossetti lived a miserably secluded life. His large, dimly lighted studio at Cheyne Walk, Chelsea, his wild, weedy, neglected garden, were very difficult of access to all but a few; but to them he was

cordial and unreserved. His work was always one of great labour and continual retouching; and when his health broke and continual insomnia forced him to the use of chloral, he worked more slowly and became more of a recluse than before. He died at the house of a friend at Bichington in April, 1882. Mr T. Hall Caine has published interesting reminiscences of this gifted man and great artist (London, 1882).

ROSSINI, GIOACCHINO ANTONIO, one of the most celebrated musical composers of modern times, was born at Pesaro, in Romagna, 29th February, 1792. His father and mother were both members of a theatrical company; the former, who was "town-trumpeter" till the revolutionary troubles of 1796, had come to play the horn in the orchestra, and the latter sang upon the stage. The future composer, when a child, played second horn to his father; but his fine voice was noticed, and he was engaged as a treble in the choir of a church at Bologna. He was afterwards placed, by the kindness of the Countess Perticini, in the Lyceum of that city as a student of music, under Professor Mattei. His first composition, while still a boy, was a symphony, with a cantata, entitled "Il Pianto di Armonia" (the Lament of Harmony). He was but eighteen years old when his first known opera, "La Cambiale di Matrimonio," a little piece in one act, was performed at Venice, in 1810. His second production, of the same buffo kind, performed at Bologna, was "L'Equivooco Stravagante," which was a failure; but by way of compensation, "Demetrio e Polibio," said to have been written in 1809, and thus really his first opera, was received with some degree of favour at Rome. The next year, 1812, he composed no fewer than five operas; but only one of them, "L'Inganno Fece," is now remembered.

The opera which first made him famous was "Tancredi," brought out at Venice in 1813; and this was followed, some months later, by "L'Italiana in Algeri," almost equally successful. By these two works the young composer had shown himself equally a master of opera seria and opera-buffa. His style, too, was now thoroughly matured, and what has ever since been recognized as the school of Rossini may be said from that moment to have declared itself. The reputation he thus obtained was hardly sustained by his next opera, "Aureliano in Palmira," in 1814; but it was, if possible, increased by "Il Turco in Italia," in the same year. This was followed by an opera-seria, entitled "Sigismondo" (1815), of which nothing except an air (afterwards introduced by Madame Pasta in another work) has survived. Next came "Elisabetta Regina d'Inghilterra" (1815), which contains some of Rossini's best music. This had an enormous success, and is especially remembered as the opera in which Rossini first set the example of writing his own ornaments and *fioriture*, which previously, in accordance with long custom, used to be either prepared or extemporized by the singers themselves. "Elisabetta" was followed by "Torvaldo e Doriska" (1815), an opera-seria, which failed, and by "Il Barbiere di Siviglia" (1816), an opera-buffa, which was hopelessly condemned on the first night, but now, more than three-quarters of a century later, is perhaps the most popular of all operas except Mozart's "Don Giovanni." "Il Barbiere" was successively followed by "Otello" (1816), "Cenerentola" (1817), and "La Gazza Ladra" (1817). Each of these works, which materially increased their author's fame, endures, and is likely to endure. To these succeeded "Armida," "Adelaide di Borgogna," "Mosè in Egitto," "Adina," "Ricciardo e Zoraide," "Eduardo e Cristina," "La Donna del Lago" (1819), "Bianco e Faliero," "Maometto Secondo," and "Semiramide." "Semiramide," the last of Rossini's purely Italian operas (his last, indeed, composed for Italy), was first played at the Fenice Opera House, at Venice, in 1823, when it seemed not very successful. Rossini, who had been musical director of the

theatre of San Carlo, at Naples, then left his native country, and went first to Vienna, where he had a most enthusiastic reception, though Beethoven was still there. He then visited London, and was no less welcomed and fêted (George IV. even coming up from Brighton to attend his concerts), after which he became director of the Opéra Italien at Paris. At this establishment, in June, 1825, he composed the little opera of "*Il Viaggio a Reims*," for the *fête du sacre*, or coronation festival, of Charles X. This was subsequently developed into the yet more fascinating "*Comte Ory*." Here, also, in "*Le Siège de Corinthe*" and "*Morse*," he gave enlarged dimensions to two of his earlier Italian works; and here, on 3rd August, 1829, he crowned the edifice of his fame with his masterpiece, "*Guillaume Tell*." From the production of "*Guillaume Tell*" until the day of his death, Rossini, though it was known that he had written a great many pieces of various descriptions—among the rest the famous "*Stabat*" (1832)—published very little. What were the actual reasons for his comparative cessation from labour his most intimate friends would find it difficult to explain, for he himself could never be brought to talk seriously on the subject, but they are generally attributed to a naturally rather indolent disposition.

An annual salary of £800 a year was given him by Charles X., under the title of director-general of vocal music in France; and at the Revolution this income took the shape of a pension of £240, in accordance with a royal engagement which the revolutionary government honoured itself by fulfilling. He spent several years at Passy, in retirement and economy, or even parsimony, returning in 1836 to Bologna, where he had in the meantime filled his residence with all the most sumptuous appliances of living. He now professed dislike to work and disregard for fame, and, in spite of many solicitations, he refused to write for the stage. The great musician became, in fact, a refined voluptuary. Only, in 1841, he gave to the world the magnificent sacred dramatic music of the Crucifixion—the "*Stabat Mater*"—which he had written several years before. From 1836 to 1847 he lived in retirement at Bologna, occupying himself with agriculture and painting, and employing some of his leisure in teaching Albani, then a promising young girl, to sing. Rossini's first wife, Isabella Colbran, whom he married in 1821, died at Bologna in 1845, and two years later he married Mdle. Olympe Pélissier. In 1847 he moved to Florence; and in 1855, his health being much impaired, quitted Florence for Paris. The only work of any importance of Rossini's late years was his "*Messe Solennelle*" (1864), which has some very beautiful music in it. He remained in France till the end of his life, dwelling during the summer in a villa he had built for himself at Passy, and during the winter in apartments in a house at the corner of the Rue de la Chaussée d'Antin, in which he died on 13th November, 1868. At Paris, where, after a time his health was completely restored, he was the object of attention and solicitude from high and low, being sought out and courted, not merely on account of his fame as a composer, but for his wit, his humour, his amiability, and his jovial good nature. His life, by Sutherland Edwards, was published in London in 1869.

ROSTOCK, a commercial city and seaport of North Germany, being the largest town, though not the capital, of the grand-duchy of Mecklenburg-Schwerin, on the Warnow, 9 miles above its mouth in the Baltic, and 177 miles north-west of Berlin by railway. The old walls around the town have been converted into a promenade. Rostock consists of the old, middle, and new town, and several suburbs. It has a ducal palace, numerous churches, a convent, two hospitals, a town-hall, and theatre. It is the seat of a university, founded in 1419, which has a library of 145,000 volumes, and with which Kepler was for a time connected.

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The principal church, St. Peter's, has a spire rising 420 feet, which forms a useful sea-mark. In the centre of the chief square, called Blücher's Platz, stands the bronze statue of Blücher, a native of the town. The house in which he was born (in 1742) still exists. Another house is likewise pointed out as the one in which Grotius breathed his last; and the spot is marked in St. Mary's Church where his body was interred, afterwards removed to Delft. Though not as prosperous as formerly, Rostock is still one of the most active manufacturing towns in North Germany, having numerous woollen factories, breweries and distilleries, vinegar and soap-works. The exports consist chiefly of good red wheat, barley, pease, rapeseed, and a few oats, with wool, rags of a very superior quality, oil cake, rape oil, bones, flax, horses, and provisions. Shipbuilding is carried on, and a large amount of merchant tonnage is owned, but vessels over 200 tons have to discharge at Warnemünde, at the mouth of the Warnow. The population in 1880 was 36,967.

Rostock having been formerly one of the Hanse Towns, had for a lengthened period, and still has, some exclusive privileges. Its vessels bore the flag, not of the grand duchy, but of the city of Rostock; and it had its own separate jurisdiction, independent of the rest of Mecklenburg, appeals from its tribunals being carried to the central court at Lübeck. The badge of the town is the number seven, alluding to some local objects, which are, or were, seven in number.

ROSTOV, an ancient town of Russia, in the government, and 36 miles S.S.W. of Yaroslav, in a marshy district, on the north-west shore of a lake of the same name. It is inclosed by a fosse and an earthen rampart, and has an enormous archbishop's palace, several monasteries, numerous churches, manufactures of linen, and a trade in herbs, chicory, honey, wax, corn, and salt, besides an important fan. The churches possess a large number of ancient and venerated relics, which attract numerous pilgrims, and the manufacture of sacred pictures forms an important industry in the town. The population in 1883 was 12,500.

ROSTOV ON THE DON, a modern town of Russia, of remarkably rapid growth, situated on the Don, 34 miles east of Taganrog. The town, as yet, is poorly built, but it has an active fishery and some shipbuilding yards, and it has a great export of corn, seed, wool, tallow, hides, and other agricultural produce, also of ores from the Ural. Shipments, owing to the shallow water on the bars of the delta of the river under east winds, have, for the most part, to be lightered and loaded at Taganrog. About the middle of the eighteenth century a fort formed a nucleus for the town, which in 1881 had 70,700 inhabitants, a number which is greatly increased at the time of the two fairs held here, and when the labourers gather for harvesting operations in the surrounding districts.

ROSTOPCHIN, FEODOR VAS'SILIVICH, COUNT, whose name is linked historically with the burning of Moscow by its inhabitants in 1812, was born in 1765 at Livna, in the province of Orel. He entered the Russian army early, and became a lieutenant at the age of twenty-one. In 1812 he was appointed governor of Moscow. The history of his government is a strange mixture of grandeur and buffoonery, of levity and severity. His preparations for the conflagration that was to greet the French occupation of the city were deliberate and unflinching. The Russian government, profiting by the terrible act which led to the destruction of the French army and the ruin of the Emperor Napoleon, were unwilling openly to countenance a measure so extreme; and although Rostopchin retained his office of governor till 1814, he remained in a species of disgrace. He accompanied the Czar to the Congress of Vienna, and in 1817 retired to Paris, where he occupied himself in literary pursuits. In 1825 he returned to Moscow, and died there on 30th January, 1826. In 1823 he

published a defence of his conduct in the Moscow affair, entitled "*La Vérité sur l'Incendie de Moscou*," and in 1853 the whole of his works, including histories, comedies, and essays, were collected and published at St. Petersburg.

ROSTRA (sometimes incorrectly called *Rostrum*), a platform or elevated space of ground in the Roman Forum, from which the orators used to address the people, and which derived its name from the circumstance that after the conquest of Latium the beaks (*rostra*) of the Antianian ships were affixed to the front of it. The rostra stood between the Comitium, or place of assembly for the Curiae, and the Forum properly so called, or place of assembly for the Comitatus Tributa. Afterwards Julius Cæsar moved the rostra (n.c. 44) to the western end of the Forum. Augustus built an additional rostra, called the Rostra Julia, in front of the temple at the eastern end of the Forum, which he had dedicated to Julius Cæsar; and this he decorated with the prows (*rostra*) of the ships of Antony and Cleopatra taken at Actium.

ROTA, a musical instrument mentioned by the fifteenth century French and English writers; it seems to have been similar to what the French call a *vielle*, and the English a *hurdy-gurdy*. Its earlier name was *organistrum*. The name *rota* (which) is derived from the wheel which forms the source of sound in these instruments. See HURDY-GURDY.

ROTATE, a botanical term applied to either the calyx or corolla when the tube is very small or entirely wanting, and the petals or sepals are united and spreading. Examples are seen in the genera *Angillis*, *Lysimachia*, *Borago*, *Silene*, *Verbascum*, *Gakum*, and *Rubia*.

ROTCHER. See AUCK.

ROTE or **ROTTA**, a mediæval lyre-like sort of instrument, the number of strings varying in different examples from four to twenty, represented in MSS. as early as the seventh century. The name was probably *chrotta*, and the guttural *ch* was lost; it is conjectured that the ancient four-string British *corth* was of the same family, if not indeed the same instrument. Besides being twanged with the finger, or a plectrum, the rote was played, in its later forms, with a bow.

ROTH ERHAM is a market-town and municipal borough of England, in the county of York, 6 miles north-east from Sheffield, at the confluence of the Rother (red river) with the Don. It has a station on the Midland line, by which it is 167 miles from London. It trades in wool, coal, corn, horses, cattle, and sheep, being one of the chief Yorkshire markets for the latter. In the town—which is prosperous, but in decay—are some extensive engineering, brass, iron, and steel works; its public buildings include

the *Empress* college, a Congregational chapel, a Roman Catholic church, and several other denominational places of worship. The parish church is a very fine ancient edifice, partially restored, and there are two other churches. In 1876 Boston Castle grounds were leased by the corporation, and converted into a place of public recreation of sports and picture gallery. The Don is crossed by a substantial bridge. The corporation consists of six aldermen and eighteen councillors, including the mayor. The population of the municipal borough in 1881 was 34,782.

ROTHESAY (pron. *Roth-ay*), a royal burgh of Scotland, situated at the head of the bay of Rothesay, on the eastern shore of the Island of Bute, 10 miles from Glasgow, and is the chief town of But-shire. The bay, stretching inland for more than a mile, and surrounded with fine villas and well-wooded slopes, is very beautiful. Being protected by hills on the land side, the town has a mild, soft atmosphere, and is a favourite place of resort for invalids. A well-lit out esplanade to the north of the harbour affords a pleasant promenade. The public buildings include town and county halls, several public halls, a museum, aquarium,

swimming baths, custom-house, excise office, banks, hydro-pathic establishment, &c. There are three Established churches, three Free churches, two U.P. churches, an Episcopal church, a Roman Catholic church, and a Baptist chapel. A statue to Mr. Stewart, a benefactor of the town, was erected in 1881. There is the clubhouse of the Royal Northern Yacht Club in the town. A cotton mill is still at work, but the main business of the town arises from the calling of tourist steamers. The ruins of an ancient castle, formerly one of the seats of the early kings of Scotland, still exist. Matthew Stewart, the mathematician, was born here. The population in 1881 was 8329.

ROTH LIEGENDES, or ROTH-TODT-LIEGENDES. See PERMIAN SYSTEM.

ROTHSCHILD. The great monetary house of Rothschild was founded by Meyer Anselm Rothschild, born of an humble Jewish family at Frankfurt-on-the-Main in 1743. Losing his father at the age of eleven, he was placed in a counting house at Frankfurt, from which he removed to an exchange-broker's at Hanover. Returning to Frankfurt, he married, and started on his own account as a money-changer and exchange-broker with the slender capital he had accumulated by thrift and industry. He appears to have had transactions with England at an early period, and, having been appointed chief court agent (*Oberhofagent*) to the Elector of Hesse-Cassel, was concerned in the transport of the subsidies paid to the German princes by England, and also in the investment of German money in English securities. The shrewdest of his sons was Nathan Meyer, who established himself in Brown Street, Manchester, in 1797, as a manufacturer of cotton goods, exporting to his father in Frankfurt. He came to England in 1799, when only thirteen years old. In 1802, having realized a fortune of £200,000, he removed to London and founded, in St. Helen's Place, a house in connection with his father's gradually increasing business. He subsequently removed to New Court, St. Swithin's Lane. From 1808 until 1812 he was engaged in receiving from his father the large sums of money intrusted to him by the distracted Continental nobility for investment in England. The Elector of Hesse-Cassel alone committed to his care the sum of £600,000. The punctual accounting for these moneys, and their repayment with interest after the fall of Napoleon, established the fame of the firm. It is a curious illustration of the rarity of common honesty that this action of the Rothschilds was a topic of wondering conversation at the Congress of Vienna. Meyer Anselm died in 1812, and left five sons—Anselm, born in 1773; Solomon, 1774; Nathan Meyer, 1777; Charles, 1788; and James, 1792. Nathan, as we have seen, had been settled in England for some years previous to his father's death; Anselm remained at Frankfurt, Solomon settled in Vienna, Charles in Naples, and James in Paris. By their combined operations, and with agencies in all parts of the world, they became the chiefs of European finance, and were united in the wealthiest copartnership of the present, or probably any other age. The leader of the operations of the house of Rothschild after the death of the founder was Nathan Meyer. He is said to have known the result of the battle of Waterloo several hours before the English government, and to have gained £200,000 thereby. By his large loan contracts, and still more, perhaps, by his dealings in bullion, he became the leading capitalist of the world. He united caution with boldness. He would never speculate in loans with Spain or her revolted colonies in America, and refrained from joining any of the joint-stock companies of his time, with a single and successful exception. The title of baron, conferred on him by the Emperor of Austria in 1822, he never used. He died during a visit to Frankfurt on the 29th September, 1836, leaving a colossal fortune. Three of his brothers died in 1856, and the youngest, James, in 1868. The present English representatives of the house

are the sons of Baron Lionel, and grandsons of Nathan Meyer.

ROTIFERA or **WHEEL-ANIMALCULES** is the name of a group of invertebrated animals well known to microscopists. The rotifers are small aquatic animals, varying from $\frac{1}{8}$ to $\frac{3}{16}$ of an inch in length. The name is derived from the appearance in front of the mouth of rotating wheels, produced by the movements of the cirelets of cilia forming the trochal disc. The body is bilaterally symmetrical and unsegmented. There is usually a well-marked tail-region or foot, which is used both in locomotion and for attachment. In some rotifers, as *Philodina*, this foot is used for creeping in a leech-like manner; in other forms, which are fixed, it is furnished with a sucking disc at the extremity; frequently it is telescopic, retractile, and forked at the extremity. The body is also often divided superficially into several rings, which can be drawn into one another like the joints of a telescope. The body is covered with a firm cuticle, which is often chitinous, and in some cases forms a hard carapace or lorica, which often bears spines. Some rotifers secrete a gelatinous tube, in which they live either singly or socially; and sometimes a tube is built up of foreign particles which the animal manufactures into little pellets.

The trochal disc or wheel-organ of the rotifer is fringed with long cilia; it varies greatly in shape, and is sometimes produced into tentacle-like processes. In a few forms it is reduced or altogether wanting. By means of this apparatus the rotifer both swims and obtains its food; for the lashing of the cilia not only drives the animal through the water, but, when it fixes itself to some foreign object by its tail, it creates a whirlpool in the neighbourhood of the mouth, in which are caught particles of food. The mouth is itself lined with cilia, and leads into a dilated pharynx, which possesses a remarkable apparatus analogous to the gastric mill of crustaceans. This is the *mastax*, a muscular bulb containing the teeth or *trophæ*, which consists of a median anvil or *incus* and two hammer-like pieces, the *mallei*; from the action of these calcareous structures on one another, every particle of food is torn and crushed before it can pass into the short œsophagus, which is lined, like the pharynx, with chitin. The stomach is large, lined with large ciliated cells, and receives a pair of glands; following the stomach is a narrow intestine opening into a cloaca, which opens on the dorsal surface in the median line just at the commencement of the tail; the intestine and cloaca are also ciliated. There is no blood-vascular system, but the body cavity is filled with a clear fluid in which are minute corpuscles. The excretory organs or *nephridia* consist of two longitudinal canals, giving off at intervals short lateral branches. There are no special organs of respiration, which is carried on by the general surface of the body.

The nervous system consists of a large lobed cerebral ganglion placed above the œsophagus, and giving off nerves to the sense-organs and the muscles. Pigmented eyespots, varying in number from one to twelve or more, are placed upon the brain, and a clear lens is often produced by a thickening of the cuticle. Tactile organs are also found, consisting of short processes (calcareous or antennæ) beset with setæ, situated in the median dorsal line, and connected by nerves with the cerebral ganglion; their place is sometimes taken by a ciliated pit.

In the Rotifera the sexes are distinct, and present very marked differences. The males are very small, and have the alimentary canal totally aborted; they live only long enough to fertilize the females. The ovary of the female is a large body lying beside the stomach and opening by a short oviduct into the cloaca. Two kinds of eggs are distinguished, the summer eggs and the winter eggs. The summer eggs have a thin, smooth, transparent shell; they are probably developed parthenogenetically, as at the season

of the year at which they appear males are not to be found. They are carried about in large numbers by the parent, and frequently undergo their early development in the oviduct. These summer eggs are of two kinds, female eggs giving rise to females, and male eggs, rounder and about half the size, giving rise to males. The winter or hibernating eggs have a thick opaque shell, and are fertilized; they are sometimes attached to the parent, but usually laid in the mud, where they remain till the following spring.

Rotifera are distributed all over the world. They are chiefly inhabitants of fresh waters, such as rivers, streams, pools, and ditches. Some may be obtained in vegetable infusions, or in the dust of dried house gutters. Some forms are parasitic on the bodies of water-fleas, worms, &c. The species of *Albertia* live in the intestine of earthworms and slugs. *Notommata parasitica* is found swimming about within the spheres of *Volvox globator*, and another species of the same genus lives in the reproductive cells of the Algae *Vaucheria*. A few forms are found in the sea, as *Synchaeta baltica*, which is one of the causes of the phosphorescence of the seas; and several species are found in brackish water at the mouths of rivers. Many species are able to endure desiccation for a length of time. When the animal feels the surrounding fluid evaporating it draws its head and tail into a ball, and pours a viscid secretion over its body, so that it is completely protected. But when the drying is accomplished too quickly the rotifer is killed beyond recall.

The relationship of the Rotifera with other great groups of the animal kingdom is not very clear. They are undoubtedly allied to the Arthropoda and Chaetopoda through the larvæ of those forms; and an interesting link to the Arthropoda was supplied in 1871 by Dr. Hudson through the discovery of *Pedalion mira*, which has six jointed limbs like those of the Nauplius larvæ of crustaceans. The Rotifera are divided by Dr. Hudson into four orders, founded on the character of the foot. The *Rhynchida* includes a number of species which inhabit tubes, and are fixed when adult; these have a non-retractile foot, ending in a sucking disc or cup. This order includes the *Ploesomatidae* and *Meliceratidae*. The first of these families only contains two British genera, *Ploesomata* and *Stephanocercis*, which are among the largest and most beautiful of the rotifers. They are found adhering to water plants, imbedding their tubes into which they can retract themselves. *Stephanocercis* has the trochal disc drawn out into five long slender ciliated lobes. Many of the *Meliceratidae* (Plate, figs. 1-3) are social, and some, adhering to each other by their posterior extremities, form spherical clusters which may be seen rolling through the waters of ponds. *Melicerata rufipes* (fig. 1) builds up its tube with pellets of its own excrements. The second order, *Bdelloida* (figs. 4-6), contains the leech-like rotifers, *Philodinidae*, which are free-swimming forms, and also creep like a leech, by alternate fixing and loosing of both ends of the body; the foot is jointed, retractile, and forked at the extremity. The Common Wheel Animalcule (*Rotifer vulgaris*) belongs to this family; the body is about one-fiftieth of an inch long, and gradually tapers to the foot, which has two pincer-like toes. It is a very widely distributed species, and has even been found in salt water in the estuary of the Tay. The male is entirely unknown. The third order, *Ploima*, contains the majority of the free-swimming forms; the foot varies in shape, and is occasionally absent. It includes a large number of genera, some of which are protected by a hard shell or lorica, as those belonging to the families *Brachionidae* (figs. 10, 11) *Pterodinidae* and *Euchlanidae* (fig. 9); *Hydatrinidae*, *Synchaetidae*, *Notommata* (figs. 7, 8) are unarmoured. The fourth order, *Scirtopoda*, has been established for the single species *Pedalion mira*, mentioned above, which has six hollow jointed setose appendages moved by muscles of the body; with these limbs this singular rotifer is able to skip about in

the water as well as to swim by means of its trochal disc. ("The Rotifera or Wheel-Animalcules," by C. T. Hudson, LL.D., assisted by P. H. Gosse, F.R.S., London, 1886.)

ROTORUA, a former township of New Zealand, was situated about 180 miles from Auckland. Previous to 1886 the district was well known as one of the most beautiful of the tourist's paradise spots of the earth. The hot water districts of New Zealand may be described as being about 120 miles in length, with an average breadth of 15 miles, and Rotorua was nearly in the centre of this mystic region, with the lakes of Rotoitua and Rotomahana in the vicinity. The first was about 17 miles long and 6 broad, but its depth did not exceed 5 fathoms. Lake Rotomahana was a rushy mere lying in a hollow surrounded with somewhat broken scrub-covered hills. The White Terrace was at the north-east corner of the lake. It was semicircular in form, and covered the hill slope. Gracefully curved for many hundreds of feet at the base, it ascended from the lake level to a height of about 150 feet, rising tier over tier in variously sized curves that copped down to each side. The terraces were formed of glistening silica, white and smooth as Parian marble, and on each tier were crystal pools overflowing with exquisitely blue water and edged with a delicate fringe of sparkling stalactites. On the summit of the terrace the spring of Tea Tarata, in a cup-shaped crater 200 feet in diameter, boiled and lashed and spasmodically threw hot waters high in air. From under a waving cloud of steam the boiling transparent water overflowed, rich in silicious deposit, to the terrace below, and thence trickling from one lovely reservoir to another, made its way in gradually cooling streams to the lake, ever, like the coral insect, adding to its own beautiful crest on as it passed. Opposite the White Terrace was the Pink Terrace, a smaller and less admired, but beautiful structure. Nine miles from Rotomahana rose Mount Tarawera, a curious truncated mountain, 2000 feet high, whose steep walls, bare, black, and seamed as if blasted with lightning, frowned down upon the clear waters and foliage-covered shores of Lake Tarawera—a scene of beauty and grandeur. This lake was 7 miles long and about 5 miles broad.

At two o'clock in the morning of the 10th of June, 1886, there was an appalling shock of earthquake, followed by a terrific roar, and suddenly an immense glare of a pillar-shaped light was observed to proceed from the summit of Mount Tarawera, which, for the first time within the knowledge of civilized men, had become an active volcano. From two of its three cones there leaped high into the heavens a immense column of flame and smoke. Molten lava and hot mud were rained abroad, while huge rocks and masses of fire were thrown up and around in all directions. Over the plain of dark light hung a great black cloud, from which meteors shot out on all sides and in every direction, shedding a weird, unearthly, bluish light. Loud reports, accompanied by very heavy shocks of earthquake, followed each other in quick succession. Balls of fire shot high in the air. Tremendous tongues of flame rose to the height of 1000 feet. For 40 or 50 miles the country was in total darkness till close on six o'clock in the day, owing to thick clouds of sulphurous matter and gypsum. When at length the darkness lifted, the scene presented by the once charming country was appalling in its desolation. For many miles around it was covered with the ashes, mud, and volcanic debris—in some places to the depth of several inches, in others of as many feet. All vegetation was completely destroyed, the trees and the beautiful tikitapa bush uprooted, and not a blade of grass was to be seen.

ROTTENSTONE is a crumbling ferruginous rock derived from the decomposition of silicious and ferruginous limestone. The calcareous matter has been removed by percolating water containing carbonic acid in solution, and the iron oxidized.

ROTTERDAM, an important commercial city, and the capital of the Dutch province of South Holland, is situated on the right bank of the Maas, about 20 miles from the mouth of that river, 12 miles south-east from the Hague, and 40 miles from Amsterdam by railway. It is built in the form of a triangle—the base of which, about a mile and a half in length, extends along the river, and derives its name from the little stream called the Rotte, which runs through the middle of the city into the Maas. The town is surrounded by a moat, and until the last few years had ten gates. The part called the Binnenstad or inner town has many narrow streets, and is separated by the High Street from the outer town (Buitenstad), which contains the fine houses of the rich merchants, and is intersected by numerous canals connected with the river. On these the largest merchantmen can come up and unload at the very doors of the warehouses. The High Street (*Hoog Straat*) is built on the dam which embanks the Maas; and an immense dyke, extending through the middle of the city, protects the Binnenstad from inundations of the sea. A new quarter, with handsome residences, has sprung up on the west side of the town. The canals which intersect the principal streets are lined with trees, and crossed by drawbridges. The modern dwellings of the inhabitants are well and substantially built. Along the Maas extend many fine quays, the handsomest of which is called the Boontjes, from the rows of trees with which it is planted. It runs for a mile and a half by the side of the river. The cathedral church of St. Lawrence contains the tombs of De Witte and several other Dutch admirals. It has also a splendid organ. There are numerous other churches and chapels, a synagogue, and some very excellent schools, many of which are supported by the public. The exchange, a large and handsome structure, contains a library, a museum, and a collection of philosophical instruments. The other principal public buildings are—the town hall, the admiralty and dockyards, the palace of justice, custom-house, academy, theatre, the principal prison in the Netherlands, and some manufactories. Rotterdam contains many valuable collections of works of art, an academy of sciences, botanic and zoological gardens, and many other useful and charitable institutions. A bronze statue, 10 feet high, stands in the great market-place in honour of Erasmus, who was a native of this city. Probably no town in the world is more abundantly supplied with water by its rivers, canals, and ditches; but owing to the system of sewage, which naturally presents great engineering difficulties in a city that, for a great part, lies below the level of high-water mark, the water was formerly impure and unwholesome. To remedy this large reservoirs have been constructed for the purpose of supplying the inhabitants with filtered river water.

Steamers ply regularly from Rotterdam to London, Harwich, Hull, Leith, Havre, Hamburg, Antwerp, &c., and to the ports on the Rhine. The principal trades carried on are sugar refining, geneva distilling, the making of liquors, brewing, iron-founding, soap boiling, and the manufacture of glass, paper, vinegar, tobacco, patent leather, oil, chemical products, and sail and oil cloths, and shipbuilding. This city is more advantageously situated, in a commercial point of view, than Amsterdam or any other Dutch town. Railways or canals connect it with all the important places in the interior; it is easily accessible, and from its position on the principal embouchure of the Rhine, as well as of the Maas, it is the grand emporium of the foreign trade of the countries traversed by those rivers. In 1878 a railway viaduct of colossal proportions was completed. It intersects the whole city from north-west to south-east. The imports and exports are similar to those of Amsterdam, but greater in quantity. In 1872 a new approach from the sea was opened by means of a canal through the "*Hoek van Holland*," and has proved of great service.

The population of Rotterdam has been doubled in fifty years—the number of inhabitants in 1880 being 152,517. The city has been extended in every direction, and the island of Eysnoord, which is on the opposite bank of the Maas, has become to Rotterdam what Birkenhead is to Liverpool.

ROTLERA, a genus of plants belonging to the order EUPHORBIACEÆ. The genus, which is found in the tropical parts of Asia and Australia, contains handsome moderate-sized trees. *Rotlera tetraococa* grows in Silhet, and yields a hard and valuable timber. The capsules of *Rotlera tinctoria*, a native of India and the Malay Islands, are covered with short stiff hairs, which, when rubbed off, have the appearance of a powder of a fine red colour, which is employed in India in dyeing silk a bright orange, and therefore forms an article of commerce in that country. The dye is obtained by boiling the colouring matter in a solution of carbonate of soda. This powder, which is known in India under the name of Kamila, is also used in skin complaints. The Arabs of Aden give it internally in cases of leprosy, and use it in solution to remove freckles and pustules. Cases of tapeworm have been successfully treated by it. The genus *Rotlera* is now included in *Mallotus*.

ROTLERIN is the yellow colouring matter of the *Rotlera tinctoria*, natural order Euphorbiaceæ; a red powder is obtained from the fruit of this plant, which has long been used in India for dyeing, and under the name of Kamila has been introduced into this country as a remedy for tapeworm. Rotlerin crystallizes in yellow silky needles, which are soluble in alcohol, but insoluble in water. The formula is $C_{11}H_{10}O_3$. It gives a deep red colour with alkalis. It dyes silk a fine orange colour, very durable, and without a mordant.

ROUBAIX, a town of France, in the department of Nord, situated 6 miles by railway north-east of Lille, one of the principal centres of the woollen trade in the north of France. It is a well-built town, and has over 80,000 inhabitants. At the beginning of the present century the population was only 8000. Besides its elegant tissues of wool, the articles manufactured are table linen, carpets, furniture, cotton, nankeens, waistcoat pieces, woollen and cotton yarn, leather, gin, &c. These products, together with corn, wine, and colonial produce, form the items of a considerable commerce, which is carried over the Northern Railway and the canal of Roubaix. The town is abundantly supplied with water by artesian wells, and has a chamber of arts and manufactures, a Gothic church, a town-hall, and a large hospital.

ROUBILIAC, LOUIS FRANÇOIS, the sculptor, was born at Lyons about 1700, but came early to this country, and here earned his reputation. His principal statues are of George I., at Cambridge; George II., in Golden Square, London; Handel, in Westminster Abbey; those of the Duke of Somerset and Sir Isaac Newton, both at Cambridge; and the well-known statue of Shakespeare, executed for Garrick in 1758, and now in the British Museum. His busts are very numerous. He died 11th January, 1762.

ROUBLE. See RUBLE.

ROUEN, the Manchester of France, and the capital formerly of the Duchy of Normandy, now of the French department of Seine-Inférieure, is situated on the right bank of the Seine, in the midst of a fine and beautiful country, 87 miles by railway north-west from Paris, 55 east by south from Havre, and had 105,906 inhabitants in 1881.

The Seine opposite Rouen runs from south-east to north-west, with a width of about 1000 feet and a depth of 36 feet, inclosing the two small islands of La Croix and Petit Gay, which lie respectively off the south-eastern and south-western extremities of the town. Between these islets the

river forms a good harbour, and is spanned by two bridges, one of stone, the central part of which rests on the south end of La Croix islet, and is ornamented with a statue of Corneille, who was a native of Rouen; the other, a suspension bridge, which connects the city with the suburb of St. Séver, on the left bank of the river, and opens in the middle so as to allow masted vessels to pass. At the southern end of the stone bridge commences the Grand Cours, or principal public walk, which is shaded by four rows of fine elms, and extends about a mile up the left bank of the Seine. Vessels load and unload close to spacious well-built quays, extending all along the right bank of the river, and backed by lofty warehouses and handsome buildings, mostly of modern erection. Leaving the quay at its south-eastern end near the botanic gardens and the Champ de Mars, and at its south-western end near the extremity of the fine avenue of Mont Riboudet, on the Havre Road, runs the broad belt of the boulevards, separating the old city of Rouen from its extensive and populous suburbs. The interior of the city was formerly very ill-built, but of late years very great improvements have been effected; the old houses are rapidly giving place to handsome modern edifices, and many of the squares or open places are furnished with public fountains. The central parts of the city are the chief seat of general commerce: the upper classes principally reside in the faubourg Cauchois and the north suburb; while the lower quarters at the east end of the town, and the faubourg St. Séver, are almost wholly inhabited by the manufacturing classes. In the splendour and beauty of its ecclesiastical and civic structures, most of which are associated with some stirring scene of the past, there are few cities of the same extent that can have any pretensions to rival Rouen. The Cathedral of Notre-Dame, which was commenced in the thirteenth century, but not completed till the sixteenth, is a noble Gothic pile, built in the form of a cross, and resembling Early English in its general architectural character. It is considered one of the finest religious edifices in France. The interior, which is lighted by 130 magnificently painted glass windows, has a total length, including nave, choir, and Lady-chapel, of 434 feet; the width is 104 feet; the height of the nave is 89 feet, that of the aisles 45 feet; the transept, each end of which is lighted by a splendid rose window, has a length of 175 feet. The lantern-tower rises to the height of 170 feet, and is supported by four massive pillars, which also sustain the basement of a beautiful pyramidal spire of east iron that springs to an elevation of 433 feet from the pavement. Besides the Lady-chapel the interior contains twenty-four chapels and several interesting monuments, among others those of Rollo, William Longsword, Louis de Brée, grand seneschal of Normandy, and the cardinals d'Amboise. The monuments formerly erected in the choir to Charles V. of France and Richard Cœur de Lion, whose hearts were buried here, and the tombs of Richard's brother Henry, the great Talbot, and several others, were destroyed by the Huguenots; but the heart and mutilated statue of Richard were found in 1838, and are now deposited respectively in the sacristy and in the Lady-chapel. The interior suffered much damage in the revolution of 1793.

The abbey church of St. Ouen, a cruciform building, with a central and two western towers, and in dimensions nearly equal to the cathedral, is a noble structure, which for unity of style (the pointed Gothic) and the harmonious symmetry of its different parts, is not surpassed by any other church in Normandy. The central tower, a model of grace and delicacy, composed of open arches and tracery, terminates in an octagonal crown of fleur-de-lis of most picturesque effect. The height of this tower is 256 feet. St. Maclou, St. Patrice, St. Romain, St. Vincent, and St. Gervais, in the suburb Cauchois, are the most remarkable among the other churches. Under the choir of St. Gervais, which is the church of the abbey wherein William the

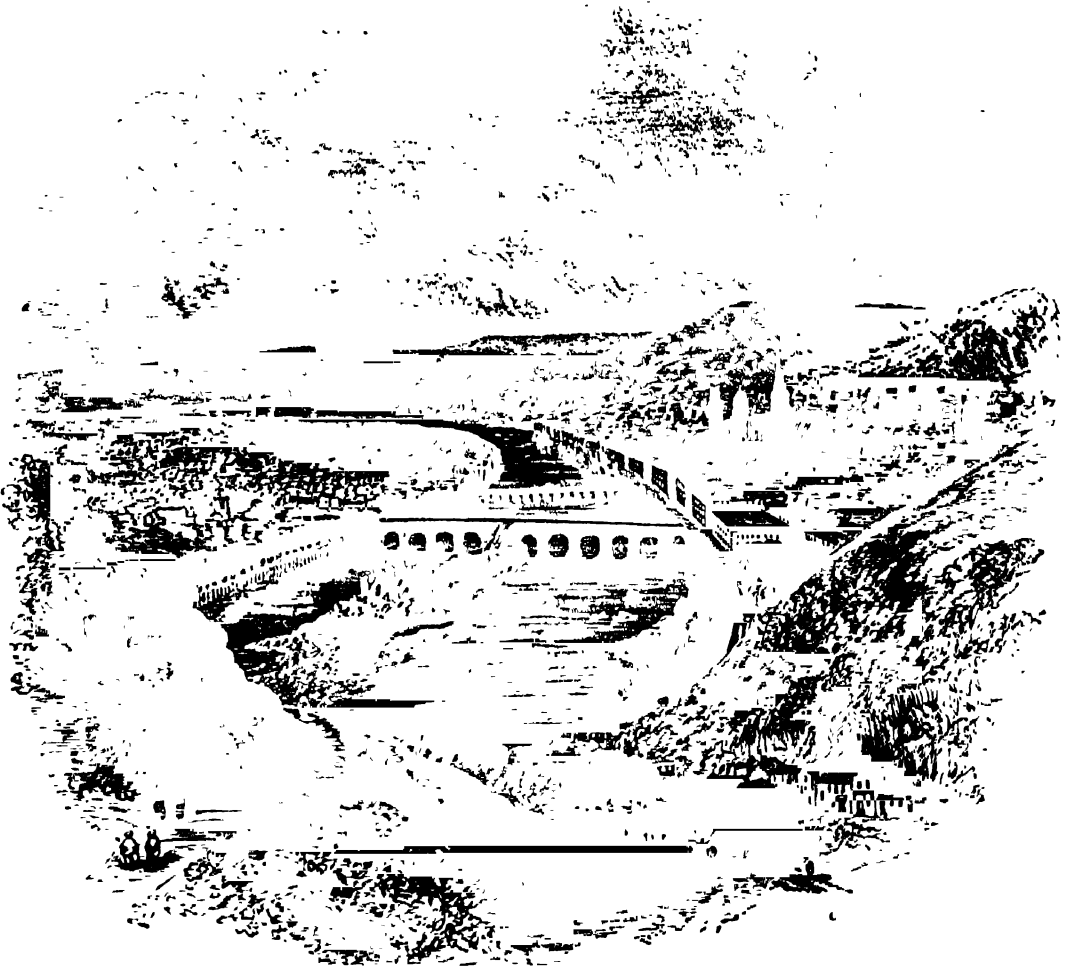
Conqueror died, there is a crypt said to be sixteen centuries old.

The chief civic

lection of paintings; the Palace of Justice, a fine old Gothic building, completed in 1499, which contains some apartments of noble dimensions, among others the Salle des Procureurs, in which the parliament of Normandy used to sit; the great Halls or covered market-places, which occupy the site of the old palace, the scene of the murder

of Prince Arthur, and form three sides of a square—over one wing is the great cloth hall (*Halle aux Rouenneries*), 295 feet long, 55 wide, and covered with a vaulted ceiling supported by stone pillars; the exchange; public fountains, the most graceful of which are those of Lisieux, La Crosse, and Croix-de-Pierre; the Bourghéroulde Hotel, the exterior of which is ornamented with bas-reliefs, representing the meetings on the Field of the Cloth of Gold; the archbishop's palace, theatres, barracks, lunatic asylum, custom-house and consular buildings on the quay, the Hôtel-Dieu, the general hospital, and the prison of Bicêtre.

Rouen gives title to an archbishop, whose suffragans are the bishops of Bayeux, Evreux, Séez, and Coutances, and is the seat of a high court. Among the other public in-



Rouen.

stitutions are tribunals of primary jurisdiction and of commerce; banks, a council of prud'hommes, a civil tribunal, a mint, academy of science and art, school of medicine, national and ecclesiastical colleges, schools of painting, sculpture, and architecture; a botanic garden; a museum in the suppressed convent of Sainte-Marie, which contains a rare collection of antiquities, works of mediæval art, and some of the finest specimens of glass painting in the world; many charitable institutions and learned societies.

The important manufactures of Rouen comprise striped and checked cottons for women's dresses, called *rouenneries*, calicoes, woollen cloth, nankins, muslin, handkerchiefs, shawls, velvet, hosiery, swanskin, flannel, hats, lace, ropes,

blankets, combs, preserved meats and confectionery, liqueurs, glue, soap, mineral acids and chemical products of all kinds, porcelain, pottery, paper-hangings, haberdashery and small wares, steam machinery and mill-work, shot, sheet-lead, tin-ware, cotton and woollen yarn, &c. There are numerous cotton-mills, driven by steam and by water power; hand-loom weaving also prevails to a considerable extent. The other industrial establishments include dye-houses, sugar-refineries, bleach-works, tan-yards, breweries, shipbuilding yards, saw-mills, mills for grinding dye-woods, copper and iron foundries, fulling and pressing mills, &c.

Advantageously situated for commerce, with a good harbour, in which the influence of the tide is felt, and in

rapid communication by railway with Paris, Havre, Dieppe, and Fécamp, Rouen has a very considerable import and export trade in its various industrial products, corn, flour, wine, brandy, fish oil, salt provisions, hides, groceries, drugs, raw cotton, hemp, wool, iron, slates, pitch, tar, and timber. It is a special entrepôt for colonial and foreign produce, and has one of the most important corn markets in France.

History.—The town existed in Roman times under the name of *Rotomagus*, which it retained till the tenth century. Under the empire Rotomagus was the chief town of *Lugdunensis Secunda*. It suffered often from the incursions of the Northmen. About the year 876 it submitted to the famous Rollo, who fortified it, and who, on obtaining the cession of Neustria and Bretagne from Charles the Simple in 911, made it his capital, and it continued to be the residence of the dukes of Normandy till William the Conqueror mounted the throne of England. The murder of Prince Arthur by order of his uncle John, king of England, took place in Rouen, which city very soon after, in 1201, was taken by Philippe Auguste, and re-united, together with the rest of Normandy, to the crown of France. The town, besieged for six months in 1418–19 by Henry V., was bravely defended by the inhabitants, commanded by the gallant Alain Blanchard, but was at last compelled by famine to submit. For thirty years after this event the English held the city, and Joan of Arc (in 1431) was burned on the spot that is now marked by a fountain in the Place de la Pucelle. In 1449 the city was recovered by Charles VII. after an obstinate siege, and has ever since belonged to the French. Rouen was the birthplace of the two Cornilles and of Pontenelle.

ROUERGUE, a former province of France, which formed the eastern part of the military government of Guienne, and now constitutes the department of AVEYRON. Its chief towns were—Rhodez, Milhau or Milhau, and Villefranche.

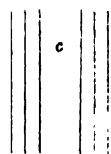
ROUGE, a substance used for painting the cheeks. It is prepared from the dried flowers of the *Carthamus tinctorius* or safflower. Rouge is the only cosmetic which can be applied without injury to the complexion.

ROUGE CROIX and **ROUGE DRAGON**, two of the pursuivants in the herald's office. The first is named from his English duties, the red-cross being that of England's patron saint, St. George; the second was created by Henry VII., and bears the Welsh ensign of Cadwallader, the last of the British kings.

ROUGE ET NOIR, sometimes called *Trente et Quarante*, a gambling game even more dangerous, because swifter and for higher stakes, than ROULETTE.

Rouge et noir is played on a table divided into two pairs of courts, each pair having one court marked with a black diamond, and one with a red one. The two pairs of courts have several transverse lines at each end. This is

Dealer.



Rouge et Noir Table.

a, Rouge; b, Noir; c, Couleur; d, L'Inverse.

the main plan, and the variations are simply due to the varying shape of the table, whether made with straight or curved lines, &c. The above diagram (which is not a pictorial representation) will make the principle of the table clear.

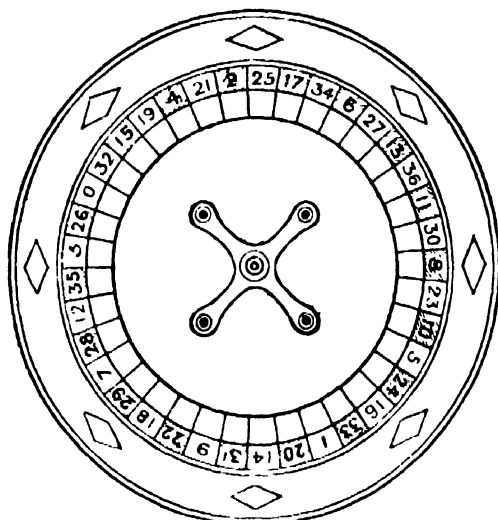
All the four chances at *rouge et noir* are equal. The dealer, sitting between the two symmetrical halves of the table, and using cards shuffled to the satisfaction of the company, deals out rapidly a row of cards face upwards until the number of pips is over 30 (and not over 40), court cards counting as 10, aces as 1. This row is the *noir*, that being merely its name connecting it with the black court on the table, and quite irrespective of the colour of the cards composing it. Then the dealer deals a second row for *rouge* in the like manner. Whichever row is nearest 31 wins. If the first card of *noir* is a black (or red) card, and black (or red) wins, then *couleur gagne* (colour wins); if it is a black (or red) card, and red (or black) wins, then *couleur perd* (colour loses) and *l'inverse* (the opposite) wins. Those who bet on *couleur* lay their stakes on the inner transverse lines; those who bet on *l'inverse*, on the outer; those who bet on *noir* or *rouge*, on their respective courts. The bank doubles the winning stakes and claims the losing ones. For example, if the first row (*noir*) were a five of clubs, a nine (of anything), an ace, a king, and a queen; and if the second row (*rouge*) were a three (of anything), a seven, a queen, a ten, and a two, then red would be nearest to 31, and the verdict would be *rouge gagne, couleur perd*. Colour loses because the first card was one of a black suit, and yet red won.

But one asks, where are the bank's chances? The bank has only one chance, but it is a sure one. If both rows of cards have exactly 31, which occurs on the average once in sixty-four deals, then half the stakes are forfeited to the bank, or else are "put in prison," and the ownership of the whole is decided by the next chance. If there is any other *refait* (equality of rows) than one of 31, the deal is not counted, and fresh rows are dealt. Stakes must not be of less value than 20 francs (16s.) nor more than 12,000 francs (£180). The rapidity of the play is very great and the stakes often enormous.

ROUGET DE LISLE, CLAUDE JOSEPH, author of both words and music of the famous revolution hymn, "The Marseillaise," was born at Montargis, Louis le Saulnier, in 1760, and educated for the army at one of the royal military schools. In 1790 he was at Strasbourg as a lieutenant, and wrote verses for Pleyel to set to music for a hymn to liberty. The "Marseillaise" was written in April, 1792, in one flash of inspiration. [See MARSEILLAISE.] But ardent reformer as he was, Rouget de Lisle was no republican, and when he refused to take the oath to the new republic in constitution he was cashiered and briefly was imprisoned. Only the fall of Robespierre saved his life. After the close of the Terror, when officers were short, he was welcomed again to the ranks, and served under Hoche. He fell into great poverty, but was discovered and pensioned by Louis XVIII. and Louis Philippe. He died in 1836. There are several of his poetical and dramatic works still extant, though nothing at all to justify the accident which gave the finest modern national melody to this third-rate poet and musician.

ROULETTE, a gambling game which shares with the still more dangerous *ROUGE ET NOIR* the honours of the gambling-hells of Europe, now happily reduced to a very few. Not many years ago, at Monte Carlo (Monaco), Speyer, Baden, Homburg, and many other places, the roulette and *rouge et noir* tables were permitted to exercise their dangerous fascinations and tempt their hundreds and thousands to ruin, financially and morally, with the regular percentage of suicides among the desperate. Every effort was made to deny the last, but facts would leak out, and public opinion set so strongly against the horrible trade that it was forbidden by one government after another, until at last very little public gambling on a large scale could be found save at the huge establishment of Monte Carlo on the Riviera. The revenue derived from the letting of Monte Carlo to the notorious Blanc supports the miserable

Prince of Monaco, in whose tiny state this festering sore can only exist, because the prince is politically independent. Actually he is so far from being independent that he is the slave of his necessities, and they force him thus to degrade



Plan of Roulette.

the once noble name of Grimaldi, or to abandon his presence at precedent and live a retired honourable life on his £600 a year. He chooses the gaudy and dishonourable alternative, and spends his thousands royally.

		0				
PASSE		1	2	3		MANQUE
		4	5	6		
		7	8	9		
		10	11	12		
PAIR		13	14	15		IMPAIR
		16	17	18		
		19	20	21		
		22	23	24		
ROUGE		25	26	27		NOIR
		28	29	30		
		31	32	33		
		34	35	36		
D 12	M 12	P 12	1 ^{re} Col	2 ^{de} Col	3 ^{de} Col	D 12

Roulette Table.

if a novice, at the decorousness, almost the solemnity, of the gambling rooms, at the various hindrances put in the way of entrance (natives of the neighbouring provinces of France being rigorously excluded, for instance), such as the enforced production of passports, visiting cards, &c. Next he is probably conscious of the scrupulous fairness with which the tables are kept. There are a few chances in favour of the bank, but they are all patent to everyone, and save these the game is absolutely fair. Consequently it is tenfold more dangerous. An occasional bit of detected cheating, a scuffle or two, or open touting for customers in the streets would drive away hundreds whom the fairness, the good order, and the apparent indifference to their coming and going attract. Therefore not far short of 500,000 visitors are received yearly at Monte Carlo.

At roulette the smallest sum staked is fixed usually at 5 francs (4s.), and the largest at 6000 francs (£210). It is played on a table of an oblong form, covered with green cloth, in the centre of which is a cavity with a sloping edge, leading down to a shallow-domed basin in the shape of an inverted punch bowl. The whole apparatus is about 2 feet in diameter. The plan of the roulette shows a sort of brass capstan standing up in the middle of the inverted "punch bowl," which is centred very truly on its axis, and can therefore be made to spin round smoothly by a dexterous whirl given to the capstan. Outside the edge of the moving part are thirty-seven small compartments numbered 1 to 36 and zero, and painted red and black alternately, except where the interpolation of zero, between 32 and 26, brings two red compartments together. At some tables there is a double zero (00) as well as a single zero, giving 38 numbers, and still more favouring the bank thereby. The banker spins the bottom swiftly to the right, flings into it an ivory ball from the left, so that the ball rolls in one direction and the domed bottom in another, and calls out *Faites vos jeux, messieurs et mesdames*. Betting then goes on until the motion of the ball and of the bottom of the table slackens enough to let the ball roll down from near its centre to its circumference; here it catches the edge of one of the compartments and is at first violently thrown off; and after one or two bumpings of this sort the ever-decreasing motion allows it to run off the moving table into one of the numbered compartments, and the game is called. Suppose the ball has come to rest in compartment 3. Then the banker calls *Trois, rouge, impair, manque* (Three, red, odd, short; that is, short of 19). Now the betting has been going on upon one of the two marked tables to right and left of the banker until the ball stopped. A stake placed on zero or on any figure is lost unless that figure turns up, but is converted into thirty-six times its value—that is, the croupier beside the banker adds thirty-five times to it and returns the thirty-six-fold pile to the lucky adventurer—if the figure appears. Of course every single number has an equal chance. If a gambler had placed five francs on number 3 he would, in our example, have received back 180 francs, profiting 175 francs by the transaction. If he had put his stake *à cheval* (across the line) on 2 and 3 he would have a chance on each. In our case he would only receive 90 francs; he would gain, that is, 85 francs, and get his stake back. If he had placed his stake between 3 and *manque*, that is, across the outer line of the numbers, he would have bet on the numbers 1, 2, 3, and any one of these would have served his turn; but now he would only receive twelve times his stake, that is, 60 francs. If he had put his stake on the cross between 2, 5, 6, 3, taking four chances, he would only get nine times his stake, that is, 45 francs, his profit being now 40 francs. If he had put his stake on the right angle formed by 3, 6, and the outer line, he would be held to cover all the numbers from 1 to 6, and would stand to receive six times his stake. In the case named he would take 30 francs. Then

The technical terms of *rouge et noir* and *roulette* enter into modern correspondence and modern romances so largely, that it is necessary to describe them somewhat in detail. And first, the visitor to Monte Carlo is surprised,

he can bet upon the first column (1 to 34), the second column (2 to 35), or the third column (3 to 36), each covering twelve numbers, but not including zero; or he can bet upon 12 P, 12 M, or 12 D the same chances, but otherwise divided, viz. into the first 12 (*premiers*), i.e. 1 to 12; the middle 12 (*milieu*), 13 to 24; and the last 12 (*derniers*), 25 to 36; and all these six methods equally give a dozen chances (disregarding zero) out of thirty-six—his stake, therefore, being either lost or returned to him threefold. Our imaginary gambler, to have won, must have staked on the *troisième colonne* or the *douze premiers*, and would have received 15 francs, profiting 10 francs thereby. Finally, the lowest possible betting is level betting, with the zero always in favour of the bank; and here there are six varieties, *pair* and *impair* (even and odd), *passe* and *manque* (19 to 36 and 1 to 18), and *rouge* and *noir* (red and black). Our gambler, to have won, must have bet upon *impair*, or *manque*, or *rouge*. If he had staked on any of these six chances and the ball had gone into zero, the stake would have been "put in prison;" that is, the succeeding trial decides the ownership of the imprisoned stake; if the gambler wins his next *coup* he gets back the imprisoned stake, but if he loses the second *coup* he loses the first stake also.

The swiftness with which these many complicated varieties are computed by the croupiers (so called because of their money-rakes or *croupes*, with which they gather in the forfeited money or push across the winnings to the successful) is quite marvellous. They will pile up several silver five-franc pieces one on the other, throwing them across the table, for instance, without letting one roll off, and will count out a bundle of notes and push them across almost by instinct. It is very rare that wrong persons claim winnings or receive them by accident. The inspectors in plain clothes mixed among the visitors, and the numerous servants in livery standing near, instantly correct any such error. Before play begins, and after any interval of rest, the table is always checked by a spirit-level. Once the bank lost heavily because some speculators discovered the table had a bias, and of course bet persistently upon the numbers on that side of the roulette.

On consideration, it is evident that one who stakes upon a single number should receive thirty-six times his stake, and his stake also, if he is to play fairly with the bank, as the chances (because of the existence of a 37th number, namely, zero) are 36 to 1 against him, and so with the other wagers. The bank has always an enormous advantage besides—that of being better able than its victims to outlive a run of bad fortune; consequently the latter, when they are hard hit, leave all their money in the hands of the bank, whereas when they win they are sure to continue, and thus give the bank chances.

ROUMANIA. The union of the Danubian principalities of Moldavia and Wallachia—which now form the kingdom of Roumania—was granted by firman of the Sultan of Turkey in 1861; the Roumanians declared their independence of Turkey in May, 1877, and this independence was recognized by the European congress of Berlin in 1878. Roumania occupies that portion of South-eastern Europe which extends from the crests of the Carpathian Mountains and Transylvanian Alps to the plain of the Lower Danube as far as that river and its northern tributary the Pruth; bounded W. by Bukovina, Transylvania, and Servia; S. by Bulgaria; E. by Bessarabia and the Black Sea. By the treaty of Berlin of July, 1878, the principality of Roumania restored to Russia that portion of the Bessarabian territory which was detached from Russia by the treaty of Paris in 1856; bounded on the W. by the river Pruth, and on the S. by the waterway of the Kilia or northern branch of the delta of the Danube and the mouths of the Stary-Stamboul. In exchange for this, the islands forming the delta of the

Danube and the territory of the Dobruddschah south of the delta, as far as a line extending from Silistria on the Danube to south of Mangalia on the Black Sea coast, were added to Roumania. The total area is 48,507 square miles, and the population 5,376,000.

Roumania consists for the most part of a great treeless steppe-like plain, occupying nearly the whole of the northern watershed of the Lower Danube; behind this plain rise the wooded Transylvanian Alps. Between the northern bend of the river to its marshy delta and the Black Sea there rises the bare plateau called the Dobruddschah, partly grass-covered, partly swampy, without tree or bush. The famous old battle-ground is crossed by Trajan's double wall or rampart, built to keep the northern barbarians out of the Roman provinces, which was a serviceable line of defence in 1854.

All the rivers are tributaries of the Danube, and flow from the Carpathians and the Transylvanian Alps across the level steppe to join its left bank. The chief are the Pruth, which now forms the boundary towards Russia, the Sereth, and the Aluta. By the treaty of Paris of 1856 the supreme control of the navigation of the delta mouths of the Danube was placed in the hands of an International Commission, which receives dues from passing vessels, and expends these in maintaining the navigability of its channels, especially of the chief or Sulina mouth. By the treaty of Berlin this commission is maintained in its functions in complete independence, below Galatz, of the territorial authorities. No vessel of war may navigate the Danube below the Iron Gates, nor may any fortresses or fortifications be maintained on this part of the river.

The cultivation of her rich soil constitutes in Roumania the occupation of certainly 70 per cent. of her arable lands, and the principal source of the country's wealth, its productions, such as wheat, Indian corn, and other cereals, oil-seeds, and wine, form the staple of the exports. Tobacco is largely grown for native consumption. The country is almost entirely dependent on foreign trade for all kinds of commodities, there existing no native manufactures of any importance. The climate of the lowlands is essentially continental and excessive; the severe winter covers the land in snow for four months, and the thermometer has been known to fall to 27° Fabr. Of mineral wealth little is utilized at present except salt and petroleum. Some gold is found in the sand of the rivers. Salt is a government monopoly. It is extracted from four mines in large blocks, and is thus sold and used for consumption. The annual yield is rather more than 80,000 tons. Petroleum is found in abundance in most localities at the foot of the Carpathians.

Commerce and industry have profited by the construction in recent years of several lines of railway, by which Roumania has been connected with Western Europe. Including non-state lines the total length in working order in 1886 was about 1200 miles. The ordinary roads are still in a primitive state. The principal highways are pretty well cared for, but the more ordinary roads, especially in the mountains and in many parts of Moldavia, are merely waggon-tracks, and as such liable to become quite impassable in winter, when there is not sufficient snow, or after a little rain in spring and autumn.

The annual income and expenditure each amounts to about £5,000,000. The chief sources of revenue consist in direct and indirect taxes, and the profits derived from the extensive state domains and valuable salt-mines, and from the salt and tobacco monopolies. The public debt of Roumania amounted, in 1885, to £27,353,204. Of the total amount more than half was contracted for public works, mainly railways. The remainder was to cover deficits, reduce unfunded debt, and pay off peasant freeholds.

The Roumanian is a Latin dialect, with many Slavonic words; it was introduced by Roman colonists who settled in

Dacia in the time of Trajan, whence the name Roumania. The people themselves, though of mixed origin, may now be regarded as homogeneous. Roumanians are spread extensively in the neighbouring countries—Transylvania, Hungary, Servia, Bulgaria; their total number probably reaches 8,000,000. Included in the population of Roumania Proper are 400,000 Jews. As a people the Roumanians are quick and light-hearted. They are well educated, and generally good linguists, speaking French, German, and Greek with equal facility; but French is the language of the court and upper classes. The peasantry are hardy, inured to the most opposite extremes of temperature, but are in a very low social condition. The women spin and weave the woollen clothes worn by both sexes. They also produce a kind of silk gauze shirt worn by themselves, and carpets of quaint patterns, with which they cover their divans or beds. The men wear coats and caps made of sheepskins and sandals of untanned ox-hides. In some parts they are semi-subterranean in their dwellings, living in holes scooped out of the ground, roofed over with branches of trees and earth. The existence of such villages is chiefly indicated to the traveller by the smoke rising from them.

The constitution now in force in Roumania was voted by a constituent assembly, elected by universal suffrage, in 1866. It has twice been modified, viz. in 1879 and 1884. The senate consists of 120 members, elected for eight years, including two for the universities, and eight bishops. The chamber of deputies consists of 178 members elected for four years. For the senate an assumed income of about £400 is required. Both senators and deputies receive a small daily payment during the session. The king has a suspensive veto over all laws passed by the chamber of deputies and the senate. The executive is vested in a council of eight ministers, and a president who is prime minister. The legal system is in exact copy of the French Code Napoleon. Education is free and compulsory wherever there are schools, but is still in a very backward condition. Nearly the whole population belongs to the Greek Church, and every village has a small church or chapel, with one or more priests, who act as curates. The ecclesiastics of this order are chosen from among the people, from whom they are little distinguished in appearance, and whose avocations they follow when not engaged in their clerical functions.

Every Roumanian from his twenty-first to his forty-sixth year is obliged to serve either in the permanent army three years of active service and five in the reserve, or in the territorial infantry five years of active service and three in the reserve, or in the territorial cavalry four years of active service and four in the reserve. The entry into the permanent or territorial army is decided by lot. All young men not taken for the conscription form part of the militia. After completing their service in the permanent or territorial army, all are enrolled in the militia until their thirty-sixth year. Inhabitants of towns serve in the civic guard till the age of forty-six, and those of the country from their thirty-sixth to their forty-seventh year form part of the *levée en masse*. The army is organized on the territorial system. The troops are well armed, and, judging from their splendid conduct as allies of the Russians around Plevna, will compare favourably with the men of any European army.

History.—In ancient times Moldavia and Wallachia formed the greater part of Roman Dacia, and subsequently became the scene of struggles between the Goths, Huns, Bulgarians, and Slavonic and Hungarian peoples, all of whom have left some traces in the present inhabitants. In the thirteenth century the Mongols broke over the land, and later a Wallachian chief divided the country between his *bojars*, or noble followers. In the beginning of the sixteenth century both principalities placed themselves under

the protection of the Ottoman Porte. From that time to 1877 Roumania remained tributary, though its subjection often proved merely nominal. Russia long desired to possess the country, and in 1710, 1739, 1774, 1792, 1826, and 1829, successive steps were taken calculated to weaken the power of Turkey and strengthen that of Russia. The intervention of Russia on behalf of the Christian population of the country has been on more than one occasion followed by the appropriation of Roumanian territory. The Russian province of Bessarabia was formed in this way, having been taken from Moldavia in 1774, when the treaty of Kainardji was signed. The union of the two principalities under one ruler was granted by the sultan in 1861, though the new name of Roumania was never acknowledged. Till May, 1877, the country paid tribute to the Porte, but at that date Roumania declared its independence of Turkey, and its freedom was confirmed by the treaty of Berlin in 1878. By this treaty it obtained the district of the Dobrukscha south of the delta of the Danube, in exchange for the portion of Bessarabia alienated from Russia by the treaty of Paris (in 1856), and now again restored to her. King Charles was proclaimed king in 1881, having been elected "domn" or lord of Roumania in 1866.

ROUMELIA ("country of the Romans"), a large region of European Turkey, nearly co-extensive with ancient Thrace and Macedonia, lies W. of the Black Sea, S. of the Balkans, N. of the Archipelago, and extends inland to Albania, as far as lon. 20° E. It comprised the vilayets of Edirne or Adrianople, Selanik or Saloniki, and Monastir or Bitolia. The surface is much varied, being traversed towards the west by offsets of the Albanian ranges, and the chains stretching into Greece; in the centre by the Despoto Daghi; and in the north and north-east by the Balkan and by Istranja Mountains, offsets from the Balkans, which run south-east on opposite sides of the Maritza, and terminate in the peninsulas of Gallipoli and Constantinople. By the treaty of Berlin of 1878 a new province, named Eastern Roumelia, was formed, the limits of which are, on the north, the Balkan range, from a point on the Black Sea coast a short way north of Cape Erenkli, eastward to the summit called Kosica, near Etropolis; on the west, a line drawn along the water-parting between the Isker (tributary of the Danube) and the Maritza River by Cadir Tepe, a summit east of the Rilo Daghi, and thence south-eastward along the crest of the Rhodope or Despoto Daghi; on the south by the Despoto Daghi to near the bridge of Mustafa Pasha across the Maritza above Adrianople, and by a line drawn thence E.N.E. to the Black Sea again, 25 miles S.E. of Burgas. Eastern Roumelia thus includes the upper basin of the Maritza River and of its tributary the Tunja, and has a coast-line of about 40 miles on the Black Sea. The chief towns are Philippopolis, Eski Saghira, Kesanlik, Slivno or Islimia, and the seaports of Burgas and Misivri. The province was left under the direct political and military authority of the sultan, but with a Christian governor-general approved by the Powers. In 1885, however, a sudden rising of the people drove out the governor and placed the province under the Prince of Bulgaria. See BULGARIA.

ROUND, a short vocal composition in three or more parts, in the performance of which the first voice begins alone, singing to the end of the first part, then passes on to the second, and afterwards to the third, &c., the other voices following successively the same routine, till all are joined together, the round, which is "infinite," continuing until the singers choose to leave off. It differs from the CATER, in that the latter has humorous words and often musical jokes as well. The earliest round is the famous "Summer is a-coming in" (circa 1250), the proof of ancient British skill in music, being the earliest specimen in

the world of vocal harmony. The round was always a favourite form in England. The first collection is the very interesting one of Ravenscroft in 1609, called "Pammelia."

ROUND TABLE, THE, of King Arthur, was made by the wizard Merlin for Uther Pendragon, who bequeathed it to the father of Guinevere, and it formed part of her marriage gift, with a hundred knights who sat at it. It had a cavity in the centre to receive the Holy Grail, if that mystic cup should return to earth. Henry VIII. showed Francis I. of France the table which was traditionally believed to be Arthur's Round Table, then preserved at Winchester, which is of course the table mentioned as being there by Caxton in his preface to Malory's "Morte d'Arthur." Arthur used it as his knights' table, so that all should be of equal rank and none should have precedence, except by his own merit, and also to symbolize the perfect union of the unbroken circle of knighthood. In Malory 150 knights are mentioned as having "sieges" at the Table Round; but in other versions of the ancient myth a smaller circle of twelve chosen comrades of Arthur is sometimes called the "Round Table." As for the 150, a hundred came with Guinevere, twenty-eight were chosen by Merlin at Arthur's request, and Gawain and Tor were knighted at the marriage feast. The other twenty were afterwards chosen as they proved themselves fit.

ROUND TOWERS. Numerous lofty towers, tapering from the base to a conical cap or roof, which crowns the summit, are found in Ireland, and are almost peculiar

had been in Ireland, and circumstantially describes them, should not also have mentioned to what purpose they were applied.

There are 117 of these towers, or the sites where they once stood, now known, and there is reason to believe they were formerly more numerous. Some of them are still perfect, and preserve their conical roof, but in the majority the roof has been allowed to fall in, and the walls only are standing, as shown in the annexed engraving.

The height of these erections varies greatly, one being only 35 feet, while the loftiest is 129, but the common range is between 80 and 100 feet. Some stand on circular bases, which form one or two deep steps round the tower. In external character all of them may be said to agree, since there is only one which does not taper, and in that case the tower is cylindrical throughout its entire height. There are nevertheless many striking differences in the mason-work and in the minor details.

The speculations of antiquaries as to the objects of rearing these mysterious piles have indeed been manifold — penitentiaries, the abode of anchorites, places of safety for goods, sepulchral stele, &c. Opinion seems now to incline to a belief in their having been erected after the introduction of Christianity, and probably for use as watch-towers. There are three round towers of a similar description in Scotland, at Brechin, Abernethy, and St. Eglshay.

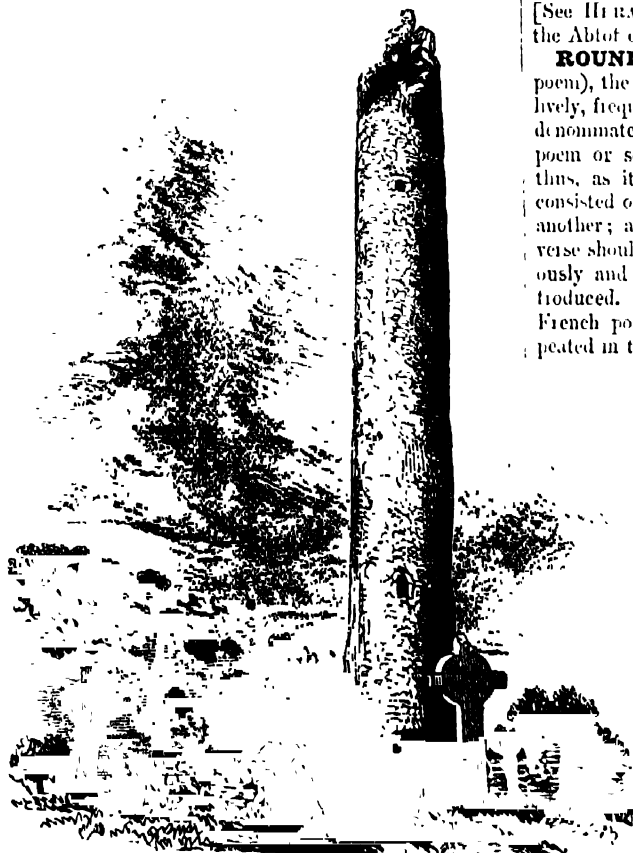
ROUND'EL, in heraldry, is a circular charge. There are eight sorts of roundels, distinguished by their colour. [See HERALDRY.] A specimen of roundel is shown in the Abbot coat of arms in the Plates on HERALDRY.

ROUND'EL or **ROUND'ELAY** (*Fr. rondel*, a little poem), the name of a simple rural strain, both short and lively, frequently used by our old English poets. It was so denominated from its peculiar construction, by which the poem or song constantly returned to the first verse, and thus, as it were, went *round*. The common roundel consisted of thirteen verses, seven in one rhyme and six in another; and one of its principal rules was that the first verse should have a complete sense, and yet join harmoniously and pleasantly with the other verses whenever introduced. This was in all main points the *rondel* of the French poets. Sometimes the first two verses were repeated in the course of the poem instead of the first only.

The *RONDLET* is one modification of the roundel, and the *troilet* is another. In the latter the lines are reduced to eight only — the first line recurs at the fourth, and the first and second are also the seventh and eighth.

Swinnburne, with that complete mastery over all forms of verse that sets him at the head of Victorian poets in this respect, elaborated from all these forms of roundel a new form of his own, which he called by the old Chaucerian-English name of *roundel*. In 1883 he published a "Century of Roundels," the most charming and original volume of lighter verse that had appeared for a long time. The new form was at once recognized as a dangerous rival to the sonnet, and many poets tried their wing at its rhythm, though such is its difficulty that none produced work which was comparable to that of the inventor. Swinnburne's roundels have lines of all kinds of length, though each roundel is of course rigidly symmetrical within itself. Sometimes they are hexameters, sometimes ordinary

eight-syllabled, four-footed iambics, sometimes the ten-syllabled metre of Shakespeare or of "Paradise Lost." In fact every variety of accent and style is admitted. The law of the roundel of Swinnburne is this: calling the two rhymes to which he limits himself *a* and *b*, he writes three triplets



Round Tower at Monasterboice, County Louth.

to that country. That they are of great antiquity appears from their having been considered ancient even in the twelfth century, when the British connection with Ireland began. Had they been then in actual use, it is not probable that so accurate a writer as Giraldus Cambrensis, who

on the following rhyme-scheme:—*Aba, bab, aba*; and after the first and the last adds the first four syllables (or first two feet) of the first line, which syllables end with the rhyme *b*. The result is exquisitely charming. Sometimes the short line is even of one syllable, or of one foot; and sometimes the longer lines alternate in length like a quatrain of eight and six, or otherwise. As a specimen, the following roundel on a dead baby's hands may serve, but it must be borne in mind that the rhythm serves equally for the fiercest outbursts, and the richest colouring, as for this tender theme. In fact, the world owes to Mr. Swinburne a new and astonishingly flexible medium of poetical expression.

"The little hands that never sought
Earth's prizes, worthless all as sands,
What gift has death, God's servant, brought
The little hands?"

"We ask: but love's self silent stands,
That lends eyes and wings to thought
To search where death's dim heaven expands

"Tie this, perchance, thou, h love know naught,
Flowers tell them, grown in lovelier lands,
Where hands of guiding angels caught
The little hands."

ROUND HEADS, a name bestowed on the Puritans, who were then hair close cropped, in accordance with the severe and somewhat affected simplicity of their habits and attire, by the "curled dandies" of Charles I. At first a nickname given in ridicule, it became a mark of distinction, which the republican party willingly accepted.

ROUND-WORMS. The round-worm (*Ascaris lumbricoides*) is a parasite which in certain cases is found infesting the alimentary canal of human beings. It resembles in size and shape the ordinary garden worm, but, unlike the garden worm it is almost white in colour. The male worms, when full grown, are generally from 4 to 7 inches in length, the females from 9 to 14 inches. Their origin is unknown, but there appear to be good reasons for regarding them as true parasites, *ææ*, such as complete their life cycle without the necessity of having to pass through the body of any intermediary bearer. In England they are not very prevalent, and in cases where they occur they are usually found single or in very limited numbers, but in some countries they are very common, and they are found in immense numbers within a single host. In Europe they are most common in Finland, the lake districts of Sweden, some parts of Holland, Germany, and France, and in Portugal. In the latter country three-fourths of the children are affected, while it is stated on good authority that in the Southern States of North America the worms attack almost every one, young or old, and especially the negroes. In some tropical countries they are also very common, and many cases are recorded where persons under treatment have voided some hundreds of these parasites. In English practice the symptoms to which these worms give rise are, as a rule, not very decided, and are of a character which renders them very uncertain indications of the affection. The signs usually observed are the existence of cricks and shooting pains in the abdomen, followed usually by more or less dyspepsia, and accompanied by itching of the nose, a feeling of sickness, vomiting, and even diarrhoea. In the case of children there are usually in addition certain sympathetic nervous symptoms, such as general restlessness, convulsive twitchings during sleep, and convulsions. The presence of these worms is generally manifested by the passing of one from the bowels or the vomiting of one from the stomach, while the ova may be detected by a microscopic examination of vomited matters or fæces. The treatment consists in the expulsion of the worms and the use of tonic and strengthening medicines to restore the general health. For expelling the worms the best remedy known is santonine, the active principle of

wormseed, which may be administered in doses of from two to four grains, according to the age and strength of the patient. It may be administered mixed with sugar and spread upon bread and butter for children, to be followed by a saline cathartic or a large spoonful of castor-oil, or it may be mixed with the castor-oil or given along with two or three grains of the resin of scammony. The medicine is best taken early in the day, fasting, and it may be necessary to repeat the dose two or three mornings successively, examining each motion for the worms. The drug is apt to cause certain unpleasant physiological symptoms, such as impairment of the vision (everything appearing tinged with yellow) while the urine becomes deep yellow or red, and some little mental confusion and giddiness may be apparent. These symptoms, however, are of a temporary nature, and they quickly disappear after the elimination of the drug. Other drugs used to expel round-worms are the powdered root of the male fern, kanna, koussou, aloes, scammony, jalap, calomel, sulphur, and turpentine; but while some of these may be used to advantage in combination with santonine, there is no remedy known that has equal power with the latter as a lumbricifuge. As soon as the parasites are got rid of such remedies as iron, quinine, cod-liver oil, Parish's chemical food, &c., are indicated for the improvement of the general health.

ROUPHIA. See ALPHIER.

ROUSSEAU, JEAN BAPTISTE, a satirist of considerable importance in French literature, was born in Paris in 1669. His father gave him a liberal education. In 1688 he attended the French ambassador to the court of Denmark, and afterwards came to England with Marshal Tallard. On his return to Paris he devoted himself to poetry. His first productions consisted chiefly of satirical epigrams, most of which were pointed against contemporary writers. His comedies and operas met with little success.

In 1703 Rousseau began to write his "Sacred Odes," much in the style of Boileau, in accordance with the solemn piety which Louis XIV. had rendered fashionable during the later years of his reign. He composed his witty but licentious epigrams at the same time, and in consequence of some satires directed against his literary opponents in 1712, an *arrêt de parlement*, given *par contumace*, condemned him to perpetual banishment from France. In 1721, after many vicissitudes, he came to England, where he published a new edition of his works. The produce he invested with the Ostend Company, which failed, and he again became dependent on his friends. He died at Brussels on 17th March, 1741. He was very clever, though artificial, and had great influence on the literature of his time.

ROUSSEAU, JEAN JACQUES, the famous philosopher, was born at Geneva on the 29th of June, 1712. He was the son of a watchmaker, a man of great sense and intelligence, and of a vigorous, joyous, and honourable character. Rousseau's mother died in giving birth to him. A sister of Rousseau the elder bestowed on the motherless child a tenderness altogether maternal, and in her old age Rousseau gratefully, generously succoured her. As soon as he had learned to read romances became his principal amusement; but they were equally to the taste of his father, and the boy and the man were in the habit of perusing them together, especially when the latter was at work. Rousseau's education was eminently that of circumstances; his mind had been enriched with many impressions and ideas, but it had not been moulded and chastened by discipline. Music seems to have been the only thing which he had regularly learned; and music was more for him than a pleasure—it was to furnish him for many years with the chief means of support. First an apprentice to a notary, and then to an engraver, Rousseau did not apply himself diligently to either occupation, and at last, when about fifteen, he ran away. From that hour

he was a wanderer. Whoever has read the most eloquent, the most enchanting, but in parts the most repulsive book of the eighteenth century, "The Confessions of Rousseau," is familiar with his early adventures. He found at Annecy a protector in Madame de Warens, a woman as frail as she was generous. She first turned him into her lover, and then pleaded for him a situation at Turin. But he soon left this, and we sometimes find him in Lombardy, sometimes in France, sometimes in Switzerland, sometimes at Venice, and sometimes anew in Savoy; and, always vagabond, he is by turns lackey, seminarist, tutor, teacher of music, and secretary of embassy. To improve his morals, which Madame de Warens had enfeebled and evil communications in Italy had endangered, he turned Catholic. In 1745, having fixed his abode in Paris, where he had several times already been, he took as companion of his household Thérèse Levasseur, a vulgar, ignorant creature, whom he treated as servant, as mistress, as wife, according to convenience or caprice. The children that were the fruit of this unfortunate union Rousseau sent to the foundling hospital, a step which no one in after years more warmly condemned than himself. His defence, such as it is, seems to be that he was too poor to educate them himself. Though Rousseau ascribed his power as a writer to his truthfulness as a man, yet long before he was famous he had studied literary art with persistency and care. Racine, Voltaire, Cicero, Horace, Tacitus were his teachers; but Virgil was pre-eminently his model. He tried also to cultivate his mind afresh by history, by philosophy, by mathematics. The academy at Dijon offered a prize for a dissertation on the influence of the arts and sciences on morality. Rousseau was the successful competitor. This essay, in which he denounced the arts and sciences as fatal to virtue, was published. The paradox startled the world less than the brilliancy and energy wherewith it was propounded and advocated. The revelation that France had acquired one great writer more was perhaps less sudden and overwhelming to hosts of admiring readers than to Rousseau himself. But the moment glory for Rousseau began persecution began too. His foes were often imaginary, and where they were real they were usually of his own creating. Rousseau obtained a second prize from the academy at Dijon for his discourse on inequality among men, which excited deeper attention and provoked sterner criticism than even the dissertation on the arts and sciences. To escape the tumult, alike of danger and of adulation, he took a journey to Geneva, and here he formally returned to the faith of his Protestant fathers. Resuming his residence in France, the happiest years of his life then followed. Madame D'Épinay built for him in 1755 that hermitage in the valley of Montmorency which enabled him to indulge so many of his tastes, especially his love for botanizing. From this paradise he was driven, as he says, by the malice of Grimm, although when Grimm was young and friendless he had introduced him to his literary friends at Paris. Three of Rousseau's principal works, the "Nouvelle Héloïse," the "Contrat Social," the "Emile," now came in rapid succession. The "Emile" incited the *parlement* of Paris to an act of foolish bigotry. Along with the condemnation of the book the imprisonment of its author was decreed. He sought, in 1762, an asylum in Switzerland. Lord Keith, elder brother of the famous Field-marshal Keith, killed at the battle of Hochkirchen, was governor of the principality of Neuchâtel. In this canton, with Lord Keith's protection and friendship, Rousseau enjoyed for several years the peace he so much needed. But the bigoted clergy maddened the ignorant peasantry against him, and at the end of 1765 he re-entered that France where he had so many ardent worshippers but so few real friends, and where the order for his apprehension was still in force. David Hume was then at Paris. Rousseau's

misfortunes kindled his commiseration, and he invited the Genevese philosopher to accompany him to England. The two friends soon quarrelled, and Rousseau renounced a pension of 100 guineas a year which the King of England had bestowed upon him. Abandoning that England he had always disliked for that France he had always passionately loved, Rousseau found an asylum in the château of the Prince de Conti. From 1770 till 1778 his abode was Paris. In the fourth storey of the Rue Plâtrière he and the unworthy Thérèse occupied small apartments. Here he displayed the simplicity and the self-denial, if not always the wisdom, of a philosopher. He rose at half-past five, copied music till seven, then breakfasted. During breakfast he arranged on paper the plans which he had gathered the day before. From breakfast till dinner he again copied music. At half-past twelve he dined; at half-past one he went to a coffee-house. He then walked into the country to botanize, returning before the evening had completely closed in. In the very hottest weather he carried, when walking, his hat under his arm, thinking that the direct action of the sun on his naked head was beneficial to his health. Exactly at half-past nine he went to bed. In rainy weather he never went out. He was exceedingly temperate, and his habits were almost pedantically regular. His features were expressive, and the ruddy tinge always on his cheeks glowed more vividly when anything interested him. He was of middle height, had a good constitution, and he could to the last walk considerable distances without being fatigued. In May, 1778, Rousseau left Paris for Emmonville at the invitation of his friend, the Marquis de Genolles. On the 6th July death put an end to his troubles, but it remains to this day doubtful whether he shot himself, poisoned himself, or died of apoplexy. All versions are given. His "Confessions" were not published till after his death. He wrote well on music, and could compose tolerably. His "Devin du Village," of which the words and the airs were both from his pen, was long immensely popular. His "Dictionnaire de Musique" was the first work of its kind ever put together, and is astonishingly good. He also invented a very good system of writing music by figures, very much on the plan afterwards worked out by CHAVÉ. Rousseau's influence upon the thought of his time was prodigious. It may almost be said that whatsoever was noble or positive in the American and the French revolutions was his. His views on education in the "Emile" are miracles of profound observation, and quite altered the educational practice of the time. They still hold their authoritative position among educationists. Rousseau tried as often in his creed as in his conduct; but in an age of mockery and scepticism truth could have had no more valiant champion, and charity can forgive all his sins, even if he had not been an incomparable genius. See "Rousseau," by J. Morley (London, 1873).

ROVIGNO or **TREVIGNO** is a seaport town of Austria, on the west coast of Istria, and 39 miles S.S.W. of Trieste, with about 10,000 inhabitants. It is situated on a rocky promontory in the Adriatic, and has two harbours, shipbuilding yards for vessels of 300 tons, manufactures of sailcloth, an extensive tunny fishery, marble quarries, and a considerable trade in wine and olives, 30,000 casks of the oil of the latter being exported annually. The town contains a cathedral, a normal school, and two hospitals.

ROVUMA, the name of a river in south-east Africa which derives its supplies from the mountains that border Lake Nyassa on the east, and which flows eastward to the Indian Ocean, reaching it a few miles north of Cape Delgado, in lat. 10° 30' S. In 1861 Dr. Livingstone unsuccessfully attempted to navigate this river by steamer, but could not pass beyond 30 miles above its mouth.

Towards August and September the middle course of the river falls so low that it can be waded.

ROWAN-TREE is a species of *Pyrus*, known also under the name of the Fowler's Service Tree and Mountain Ash. Its Latin name, *Pyrus Aucuparia*, and its various modern designations, have been given to it on account of the general use made of its fruit for the purpose of decoying birds into traps. It is much cultivated, both on account of its valuable wood and rapid growth. It flourishes in most parts of Europe, in the north-west of Asia, in Nova Scotia, and other regions of the northern parts of North America, and in the island of Japan. It does not, however, attain equal magnitude in all climates. This tree has enjoyed from remote times a distinguished reputation. A belief in its power against witchcraft and evil spirits of all kinds seems to have been prevalent at a very early date.

The rowan is a graceful tree, with an erect stem and orbicular head. It grows very rapidly for the first three or four years of its existence, and on this account is well adapted for planting with young oaks, which it protects till they grow above it, when it is destroyed by their shade. It also forms excellent coppice-wood, the shoots being adapted for poles and for making hoops. The bark is used by tanners. In Wales it is as religiously planted in churchyards as the yew is in England.

The rowan tree will grow in almost any situation, being found on the sea-shore and the tops of mountains. Hence it is valuable for planting in places exposed to the sea or in very open situations. It flourishes best in a free soil, near water, and in open dry spots, especially in a moist climate.

ROWE, NICHOLAS, poet-laureate, was born at Little Bedford, in Bedfordshire, in 1673, and was educated at Westminster School under Dr. Busby. In 1700 he produced a successful tragedy, "The Ambitious Step-mother," which was followed in 1702 by "Tamerlane." As Louis XIV. was represented unfavourably as Bozot, and William III.

as the villain, it obtained much success, and for a long period afterwards it was regularly performed in London on the anniversary of the landing of William III. His other pieces are "The Fair Penitent" (1707); "The Royal Convert" (1708); "Jane Shore," a tragedy written in imitation of Shakspeare, which long kept the stage (1713); and "Lady Jane Grey" (1715). His chief service to literature, however, was rendered by his edition of Shakspeare, with a life, issued in seven volumes in 1709. This represents what may be termed the first of the modern critical editions of Shakspeare's works, and the biography embodies most of the traditions then extant of the poet's life. Most of them were obtained from Betterton the actor, who had collected them at Stratford-on-Avon during a visit paid there for that purpose. Rowe, who was made poet-laureate on the accession of George I., died on 6th December, 1718, and was buried in Westminster Abbey, and his epitaph was written by his friend Pope.

ROWING is the art of propelling a boat through the water by the use of oars or sculls, the rower or sculler sitting with his face towards the stern, and his back to the bow of the boat. It is performed by reaching forward with the oar in the air, then dipping the blade of the oar into the water and throwing the body straight backwards. The oar is thus drawn through the water, and the stroke is completed by pulling the handle home with the arms to the chest, by means of the resisting power of the thwarts (or seat) and stretcher (or footboard). Rowing with sculls is performed in the same way, only that instead of using one instrument (the oar) with both hands, a scull is used with each hand. Both oars and sculls are divided into three parts, termed the handle, the loom, and the blade. The oars used in modern racing-boats vary from 12 feet to 12 feet 6 inches in length, and the sculls from 10 feet to

10 feet 4 inches. Formerly both were made square in the loom; now, however, they are round, this shape being found much easier to work with and less noisy. Both are kept in their proper places in the rowlock by a circular button of a peculiar shape, on the leather, which plays against the inner side of the thowl. To row well is by no means an art of easy acquirement. It needs to be learned early and under good instructors; and whether we pull for pleasure or for speed—in a racing eight or in a wholesome sea-going boat—there is but one way of doing it properly. The action in rowing consists of two parts, the stroke and the feather. The former is the pulling of the oar through the water with the blade; the latter the turning of the oar at the end of the stroke, by dropping the hands and turning down the wrists, and thereby bringing the blade into a plane with the surface of the water. It is also used to denote the bringing back of the oar, in the same position or plane, to begin another stroke, the oar being then said to be on the feather. A perfect style of rowing is characterized by a firm, clean entrance into the water, a powerful, steady, and horizontal stroke, and a feather quick and low, yet sufficiently high to clear the water in whatever state it may be.

Modern racing-boats are all fitted with outriggers, and are divided into eight oars, four oars, pair oars, and sculling boats. In the old-fashioned boats the rowlock, in which the oar rests and works, is fixed upon the side of the boat itself, upon the gunwale or wale streak; in modern boats it is fixed at the extremity of an outrigger or iron framework rigged out from the side to support it. By this improvement the oar-man is enabled to use a longer-handled oar, and to obtain greater power over the boat than under the old method of construction, and this power has been further increased by the introduction of the sliding seat. The oars are numbered from the bow or front of the boat to the stern or after-part. Thus the first oar in an eight is termed bow, the second No. 2, and so on to the eighth or sternmost, who is called stroke, as he sets the time or stroke. The odd numbers form the right, star-board, or bow side, and the even numbers the left, port, or stroke side oars. The coxswain or steersman sits on the aftermost thwart, facing the crew and the course they are travelling. He steers by means of a yoke or rudder lines attached to the extremities of a brass cross-piece or yoke, which fits across the top of the rudder.

ROWLANDSON, THOMAS, a celebrated caricaturist, was born in Old Jewry, London, in July, 1756. In his sixteenth year he was sent to Paris, and entered as a student in the École des Beaux-arts. At the end of two years he returned to London, and became a student in the Royal Academy, where he distinguished himself by his studies in chalk. His father failing in trade he was thrown on his own resources, and began to make designs for the booksellers. An aunt bequeathed him the sum of £7000. All this he quickly wasted in gambling and debauchery, and only when his means were exhausted would he sit down to work. Then he threw off his satirical sketches almost without effort, and with surprising rapidity; and being free from all restraint, and, however coarse, full of animation and cleverness, they were eagerly purchased. Rowlandson's drawings—all farcical, but very clever caricatures—were made with a reed pen, and tinted with water-colours. Some of them are of large size, and all indicate great skill of hand and keen observation. Altogether his productions are said to number some thousands, so that with all his dissipation he must have possessed considerable industry. He died on 22nd April, 1827.

ROWLEY RAG, an extensive mass of basalt bursting through the carboniferous rocks in the South Staffordshire coalfield. It forms the high ground of Rowley Regis—a ridge about 2 miles in length and 800 feet in height—and

is largely quarried for road-metal and the making of paving blocks. In some exposures it exhibits the remarkable columnar structure so familiar in the Scotch Isle of Staffa and the Irish Giant's Causeway; and the rock weathers in the form of concentric spheres, thus giving to old sections a most curious appearance. On decomposing, the Rowley Rag becomes a soft claystone—locally termed "rotch"—and this is dug at the base of the hill for the manufacture of tiles and draining pipes.

ROWLEY, WILLIAM, an English dramatic writer, of whose life little is known. He lived during the reign of James I., and was at the head of Prince Charles's company of comedians. Rowley wrote many plays, of which the following are the best known:—"A New Wonder, a Woman never Vext" (1632); a tragedy called "All's Lost for Lust," and a comedy, "A Match at Midnight" (1633); "A Shoemaker a Gentleman" (1638); "The Witch of Edmonton" (1658), a tragic-comedy (in this he was assisted by Thomas Dekker, John Ford, &c.); "The Birth of Merlin" (1662). Several of his plays are printed in Dodsley's collection.

ROXBURGH CLUB, a literary society named in honour of the illustrious book collector, John, third duke of Roxburgh, whose splendid collection of rare and curious books was dispersed at the hammer in 1812. The sale was rendered memorable by the very high prices (for that period) which were obtained for the gems of the collection—notably the sum of £2260 for a copy of the first edition of Boccaccio's "Decameron," and £1050 10s. for the "Recuyell of the Historiis of Troye," printed in 1471 by Caxton—and a number of literary antiquaries subsequently resolved to form themselves into a select society for the publication of MSS. and rare printed books. There were originally thirty-one members, and no great increase in the number has ever been permitted. The books published are all extremely rare, and are chiefly selected on account of their antiquarian interest, or from the light they throw upon the history, languages, and manners of earlier times. They are issued only to members of the club, with the exception of such copies as are presented to the more important libraries. A list of the publications up to 1861 is given in Lowndes' "Bibliographer's Manual." Since then the club has issued two volumes annually.

ROXBURGHIA CÆ is an order of plants classed among the *MONOCOTYLEDONS*. It consists of a single genus, *Roxburghia*, which presents so many peculiarities that it has been found impossible to include it among the genera of any other order. There are three or four species, natives of India and the Malay Archipelago. They grow in moist valleys, twining among the trees. The leaves are broad, with several longitudinal nerves and transverse veins. The flowers are greenish in colour, very fetid, but large and handsome. The perianth has four segments. The ovary is one-celled, ripening into a many-seeded capsule opening by two valves.

ROXBURGHSHIRE, a county of Scotland, bounded N. by Berwickshire, E. and S.E. by Northumberland, S. by Cumberland, S.W. by Dumfriesshire, W. by Selkirkshire, and N.W. by Edinburghshire. Its form is very irregular, the greatest length N.N.E. to S.S.W. is 13 miles; the greatest breadth, at right angles to the length, is 30 miles. The area is 670 square miles, or 428,494 acres, of which about two-fifths are cultivated. The population in 1881 was 53,442, of whom 28,006 were females. In 1871 the inhabitants numbered 53,974, so that there was a decrease of 532 in the ten years.

Surface and Rivers.—The whole surface of the county is undulating; but in the northern and central parts the hills are of less elevation than along the English and Dumfriesshire borders. A range of lofty heights extends from the eastern extremity of the shire south-west along the border of Northumberland, to which the general designa-

tion of Cheviot Hills, properly applicable only to a part of the range, is sometimes given. Carter Fell, in the Cheviots, on the English border, is 1889 feet high; Eildon Hill Camp, near Melrose, 1385 feet; and Dunian, near Jedburgh, 1095 feet. The hills are green and round-topped, with a soil of clay and sand, affording pasture for Cheviot and Leicester sheep. This range separates the basin of the Tweed from the basins of the Coquet and the Tyne. From the head of the Jed Water the hills turn westward and run through the county into Dumfriesshire, separating the basin of the Tweed from that of the Eden. From each side of the range irregular groups overspread a wild pastoral district, drained by the upper waters of the Teviot on the one side and the Liddel on the other.

Roxburgh belongs almost entirely to the basin of the Tweed. That river itself first touches the border at the junction of the Ettrick Water, and flowing east quits the county about 5 miles west from the town of Coldstream, in Berwickshire. The principal affluent of the Tweed is the Teviot, which flows through the shire in nearly its whole extent, giving to the greater portion of it the name of Teviotdale. It rises in the hills on the south-west border towards Dumfriesshire, and runs with a very direct course north-east, past Hawick and Denholm, to Lickford, where it turns north, and joins the Tweed at Kelso. Its whole course is about 35 miles. It drains nearly the entire county, receiving several small affluents from the Northumbrian border, from the range which separates Liddesdale from the rest of the shire, and from the border of Selkirkshire. The Ettrick, the Gala, the Leader, the Eden, and other small tributaries of the Tweed, have part of their course in this district. Liddesdale is drained by the Liddel and the Hermitage, a tributary of the Liddel, with some smaller streams, all of which belong to the basin of the Cambrian Eden. The Liddel receives all the other waters of Liddesdale and joins the Esk, which falls into the same estuary as the Eden. Not one of the streams is navigable, except for ferry or other very light boats. The trout-fishing, formerly unequalled, is injured by the drainage.

Soil, Agriculture, &c.—The low fertile lands in the valleys of the Tweed and the Teviot have a rich loamy soil, suitable for turnips; and crops of wheat, barley, potatoes, oats, beans, and grasses are raised. Much land has been gradually reclaimed and cultivated, the best manures are used, and arable as well as pastoral husbandry is in a high state of perfection. The farms are very large as a rule. The hills are green to the summit, and afford valuable pasturage for sheep. The favourite breeds are the Cheviot for the hills, and the Leicester or long-woolled for the lower grounds. A cross between these two is found to answer very well. The most common sort of stock is the Teesdale or short-horned, but the Ayrshire and the Highland kyloes are also kept. Swine and poultry are reared by cottagers, farm-servants, tradesmen, and others, but not to any great extent by the farmers. There are some very productive orchards in the neighbourhood of Jedburgh, Kelso, and Melrose. Marl is found in vast quantities in several parts of the county, which is also well supplied with limestone and freestone. Various branches of the woollen manufacture are carried on at Hawick, Wilton, Jedburgh, and Kelso. Roxburghshire is completely intersected by the North British Railway and its branches.

Roxburghshire is divided into four districts and thirty-four parishes. It returns one member to the House of Commons, and another is returned by the Hawick district of burghs.

History and Antiquities.—In the earliest period of authentic history this county seems to have been comprehended in the territories of two ancient Celtic tribes; the Gadeni in the west, and the Otadeni in the east. Of

these the cairns and barrows or tumuli, and other sepulchral antiquities which have been found, are supposed to be relics. Druidical stones, some of them arranged in circles, are occasionally met with, and the Eildon Hills and other eminences are crowned with forts. After the conquest of this part of the island by the Romans the county was comprehended in the province of Valentia. Roman roads were carried across it (remains of the Watling Street still existing), and Roman stations established within it.

On the departure of the Romans Roxburgh was exposed to the attacks of the Angles, who founded the Northumbrian kingdom. The natives struggled long and gallantly, and to their enemy was due the construction of the Catrail, a vast ditch with a rampart, extending from near Galashiels in Selkirkshire, to Pell Fell, on the border of Northumberland, 45 miles, of which 18 are in Roxburghshire. The Angles gained ground, and before the end of the sixth century occupied Teviotdale, which became part of the Kingdom of Northumbria. In the tenth century it was relinquished by the Anglo-Saxons to the King of Scotland, together with the rest of the Scotch-Northumbrian territory comprehended under the general name of Lothian. From this time the county was gradually strengthened by castles and towers against that hostility to which its situation on the border peculiarly exposed it. Jedburgh Castle was erected in the time of David I., and is the earliest of which any distinct account can be given. Roxburgh Castle was perhaps of as early date, and at one time of greater importance. Heriot's Castle was built during the reign of Alexander II. (1214-49). The ecclesiastical ruins are the abbots of Kelso, Jedburgh, and Melrose. There are remarkable caves at Jedburgh, Roxburgh, and Ancrum, which appear to have been used as habitations, probably as temporary retreats during the border wars.

ROXBURGH, anciently a town of importance, now a very small village with 1053 inhabitants, is situated about 3 miles south-west from Kelso, on the opposite bank of the Tweed. There are some portions remaining of the very thick and strong walls of Roxburgh Castle, which was built by the Northumbrian kings, and was the scene of many battles. In 1169 James II. was killed in this parish by the bursting of a cannon, during a battle with the English. The old town was burned down, and none of it remains.

ROYAL ACADEMY OF ARTS IN LONDON.

An institution which had been formed in 1754, called a Society for the Encouragement of Arts, Manufactures, and Commerce in Great Britain, was the first which included among its objects the offering of rewards to the fine arts. Attempts were made about the same time by the principal artists to form a permanent academy for the cultivation of painting, sculpture, and architecture, which failed. In 1760, however, with the assistance of the above-mentioned society, who liberally allowed the use of its great room for the purpose, they were enabled to open the first public exhibition, which though not entirely satisfactory to the promoters, attracted great attention, and was for several seasons successfully followed by a similar display of talent. They were in consequence continued to apply to the king for a charter, which they readily obtained, and in 1765 were constituted a body corporate under the title of the Incorporated Society of Artists. This was soon found to be of too miscellaneous a character, and its members too numerous to render their admission any mark of merit; schisms arose, the principal artists withdrew, and finally a new constitution was drawn up, which was laid before the king and obtained his royal assent 10th December, 1768. Thus was founded the Royal Academy of Arts in London for the purpose of Cultivating and Improving the Arts of Painting, Sculpture, and Architecture, and the original thirty-six academicians included the great mass of talent existing at that period in London.

The royal approval of the new society was followed by prompt and effective assistance; apartments for the schools were fitted up in old Somerset House, and rooms supplied in Pall Mall for the exhibitions; while for several years George III. made up every deficiency in their expenditure from his privy purse. When old Somerset House was purchased by the nation as a site for a number of public offices, the king took care to reserve a portion of the new building for his academy. In 1776 the plans of the new establishment were submitted to the approval of the president and council, and the apartments so appropriated were fitted up with a degree of magnificence worthy of a royal palace, the talents of many of the principal members having been employed in its decoration. In July, 1780, the preparations being completed, the Royal Academy obtained possession of their new residence by an order from the treasury to the surveyor-general of the works, and their first exhibition in Somerset House took place in the following year. In 1834 a proposal was made by Lord Grey and the existing ministry to transfer the establishment from Somerset House to Trafalgar Square, and the removal took place two years afterwards. The accommodation at Trafalgar Square proved very unsatisfactory in many respects, and after it had been endured for many years it was resolved to erect a new building on the most approved model in Piccadilly. This resulted in the erection of the fine building called Burlington House, which was opened in 1869, and a large part of which has ever since formed the home of the Royal Academy.

The picture galleries of Burlington House are light and lofty, and they are appropriately decorated and fitted up. The annual exhibition, which is open from the beginning of May to the end of July, forms one of the largest picture shows of the world, and the proceeds derived from it form the chief income of the society. In the winter some interesting exhibitions of loan pictures are held, and in addition the Diploma Gallery, which contains an interesting collection of pictures presented by academicians on receiving that distinction, is kept open daily from 11 till 4 (free).

The Royal Academy also fulfils important functions as an educational establishment, appointing, as it does, teachers and professors of painting, sculpture, architecture, anatomy, and chemistry. All persons are admissible as students of the Academy provided they possess respectable characters and afford indications of talent. Their names remain unknown till judgment is passed on the specimens which they send in, and when admitted they receive a gratuitous education from the best masters. Prizes are annually given to encourage meritorious students, and those who have gained the biennial gold medal have from time to time an opportunity of being sent abroad to study for three years at the expense of the Academy.

The library of the Academy, which is being continually increased, contains all the best works on art, besides a valuable collection of prints and engravings.

In 1863 a royal commission was appointed to inquire into the position of the Royal Academy, as a very deep and widespread feeling of discontent then prevailed with respect to its organization and working. The result of the inquiry was that the commissioners recommended that the constitution of the society should be much extended; that the number of academicians should be increased; that several non-professional academicians should be associated with them; that the number of associates should be increased; and that workmen of excellence in metal, wood, stone, &c., should receive medals and be called Royal Academy Medallists. Most of these recommendations were afterwards carried into effect, and hostile criticism was for a time appeased. During recent years, however, there has been a growing feeling of dissatisfaction among artists and art critics with the management of the Academy, and these feelings were very powerfully expressed in 1886 by

Mr. Holman Hunt, Mr. Clausen, Mr. Crane, Mr. Quilter, and others, their utterances giving rise to very considerable discussion. The principal charges brought against the Academy were that the interests of outside artists had been neglected in an unjustifiable manner; that the Academy used their position, one of public trust, mainly for the advancement of their personal interests; that they had done nothing to form, raise, or encourage any adequate standard of English painting; that they had neglected the one national art of England, that of water-colour painting, and all the minor decorative arts; that they had steadily discouraged all poetic, religious, or historic art; and further, that their schools were the worst in Europe. Complaint was also made respecting the mode of electing academicians and associates, severe strictures were passed upon the annual exhibitions, and the special privileges of the academicians were denounced as unjust and unreasonable. It would be beyond the scope of the present article to enter into the merits of this controversy, but the general impression made upon the public mind was that a good case had been made out for the appointment of a royal commission to inquire into the position of the Academy, and that the recommendations of such a committee should receive the attention of the legislature.

ROYAL ACADEMY OF MUSIC. The present institution of this name (founded 1822), which has rendered such priceless services to the musical art in this country, must not be confounded with the association of the same name (founded 1720) familiar to all students of Handel's life. Before noticing the present Royal Academy it is necessary therefore to notice its predecessor of almost exactly a century before.

Handel's Royal Academy of Music was instituted by the leaders of society under George I., who subscribed among them £50,000 for the purpose, for the production of Italian opera in London. Handel, as he was called, was then the leading writer of Italian opera, and he travelled over the Continent for the Academy engaging singers. Bononcini and Ariosta, the composers, were also brought to London to assist Handel in providing new operas, and everything was done on a like splendid scale. One opera ("Atsace") was peculiar as being the joint work of the three *maestri*, each one taking one act; and it is hardly needful to say that though the other acts were good, Handel's was beyond comparison the best. Many fine original works were composed for the Academy, but at the close of nine seasons (June, 1728) it was found that all the capital fund was gone, and that the treasury was bankrupt. The company therefore was dispersed. Disputes among the singers, the unprecedented success of the "Beggan's Opera" ("which made Gay rich, and Rich gay," so runs the joke against the two successful managers), and the rather lavish style of management adopted, were the causes of this breakdown.

The present Royal Academy of Music began (as the "Academy of Music") upon a proposal of Lord Burghersh, afterwards Lord Westmoreland, with King George IV. as its patron and Dr. Crotch as its principal, 5th July, 1822, though teaching did not actually commence till the following year. £1000 was raised, and annual subscriptions also instituted, the king giving £100—a donation always afterwards continued by himself and his successors. The house in Tenterden Street, still the house of the Academy, was taken. There were to be as many resident elected pupils, half boys and half girls, as the funds would allow, short of forty of either sex, the fee being 10 guineas, or for outside students, 20 guineas. In a year it was found that a large deficiency had already accrued, and a radical change was made, the fees being set at £10 for resident and non-resident students alike, and Lord Burghersh applying to the government for a grant. This application was again and again renewed in vain, although the funds were exhausted and an appeal to the public became necessary. The govern-

ment at last granted a charter (23rd June, 1830), and the Royal Academy of Music then came into being. Dr. Crotch was succeeded by Mr. Cipriani Potter in 1832. In 1834 William IV. generously secured £2250 to the Academy out of the Westminster Abbey festival of that year, and some scholarships were founded; but financial troubles again overtook the institution, and the principal disappeared. By 1853 the funds were for the second time almost exhausted. A second reconstruction was therefore made, the governing body being now assisted by the body of professors in the management, a course which at once produced the discontinuance of the costly plan of the residence of students. Mr. Charles Lucas succeeded Mr. Potter as principal in 1859. In 1861 financial matters had again become critical and thoughts of abandoning the institution were entertained. But this time Mr. Gladstone was in power, and a grant of £500 a year was given to the Royal Academy, only to be withdrawn, however, by Mr. Disraeli (Lord Beaconsfield) in 1867, with the harsh remark (quite unjustifiable) that "the results of the institution were not of a satisfactory character." In van Sternedale Bennett, who had become principal in 1866, protested against this cruel misstatement of fact; the only reply was an official letter (letting the cat out of the bag) that "it is not so expedient to subsidize a quasi-independent association as to establish a system of musical instruction under the direct control of some department of government. Thus snubbed and neglected, its funds altogether gone, our national school of music determined to close its doors. But now, to the lasting honour of the musical profession, the professors of the Royal Academy came forward, took the charter into their own hands, formed a board of management from among their own, the Earl of Derby at its head, and inaugurated a new era (1868). Mr. Gladstone at this crisis was in power most fortunately, so that the new board found themselves once more subsidized with the modest £500 cheerfully withdrawn in 1867. Since this time so energetically has the Royal Academy been conducted that its accommodation has been continually too small for the ever increasing crowd of students, notwithstanding the great government and municipal schools of music which compete with it. Sir William Sterndale Bennett died in 1875, and was succeeded both as principal of the Royal Academy and as University professor at Cambridge by the leading English musician after himself, namely, Sir George Alexander Macfarren.

The status maintained by the Royal Academy of Music has been of the highest rank throughout as regards its work and influence. It has raised musical teaching to the dignity of a profession in the teeth of the steady neglect and almost opposition of the government. Forced to rely upon its own great merit and industrious exertions, it has achieved, however, a probably finer position and gained a stronger hold upon the attention of the nation than a merely state-aided, and therefore "red tape" department could possibly have done. The eminence of its principals (each one the leading musician of his day) and of its professors, and the numerous students who have risen to great distinction in their art, have been throughout remarkable. Among the original staff in 1823 we find Attwood (Mozart's pupil), Shield, Sir George Smart, Horsley, J. B. Cramer, Sir H. Bishop, Crivelli, Clementi, Diabelli, Lindley, Loder, Cipriani Potter, Ries, Henry Smart, &c.; and among the pupils, W. H. Holmes, Kellow Pye, Henry Blagden, &c., these latter, like many of the students after them, gradually taking their posts as masters in their turn. At present there are seventy-eight professors, teaching every possible instrument and every class of voice; and languages, deportment, and stage training are also taught. The annual fee is 30 guineas, and the entrance fee 5 guineas. Among recent professorial lists are found the names of Sir George Macfarren and his brother Walter, Sir Julius Benedict, Sir

George Elvey, the Rev. Sir F. Gore Ouseley, Sir John Goss, Henry Leshe, Garcia, Brinley Richards, Alberto Randegger, Prosper Sainton, W. G. Cusins, Ebenezer Prout, Charles Halle; and practically all the chief players of the various orchestral instruments at the date of any list are always to be found upon it. As a sample of the work of the Royal Academy, and the benefits it has conferred upon England, it may be added, in conclusion, that it has trained both its last presidents, Sir W. Steindale Bennett and Sir George A. Macfarren, as well as Sir Arthur Sullivan, John Hullah, J. F. Burnett, F. Cowen, Brinley Richards, W. G. Cusins, Alex. C. Mackenzie, Maud V. White, and Agnes Zimmermann, to name only a few of the composers in the first rank of English musicians, and has always educated a very considerable proportion of her best vocalists and instrumentalists.

An excellent account of the Royal Academy of Music, and a mainly statement of the claims it has upon the nation's gratitude, was given by Sir George A. Macfarren in the *Nineteenth Century*, August, 1882.

ROYAL INSTITUTION, an institution founded in 1799, and incorporated by royal charter in 1800, "for the educating knowledge and facilitating the general introduction of useful mechanical inventions and improvements, and for teaching, by courses of philosophical lectures and experiments, the application of science to the practical purposes of life." Count Rumford was one of the most active founders of the institution, and among its professors have been such men as Dr. Thomas Young, Sir Humphrey Davy, Michael Faraday, and John Tyndall. The members are elected by ballot, and pay 10 guineas on admission and 5 guineas afterwards, or a composition of 60 guineas. The buildings of the institution are in Albemarle Street, Piccadilly, and the lectures given there are the most celebrated in the world.

ROYAL MARRIAGE ACT. By this Act (12 Geo. III. c. 2) no descendant of George III., other than the issue of princesses married into foreign families, is allowed to contract a marriage without the previous consent of the sovereign, and any marriage contracted without such consent is declared void. But such descendants, if above the age of twenty-five, may, after twelve months' notice given to the Privy Council, contract marriage without the consent of the crown, unless both Houses of Parliament expressly declare their disapproval of such marriage. Under this Act the marriage of the Duke of Sussex in 1793 to Lady Augusta Murray was declared to be null and void, and the claims of their son, Sir Augustus d'Esterre, were declared invalid by the House of Lords in 1844. The Act was not passed without great resistance in Parliament, and is still considered by many to be impolitic and arbitrary.

ROYAL SOCIETY OF EDINBURGH. This society was organized by Principal Robertson, the historian, and was formally constituted at a meeting held in the College Library, 23rd June, 1783. It obtained a charter in 1785, and commenced holding meetings in the College Library, which were continued until 1810, when it purchased a building in George Street. In 1811 it obtained a new charter, whereby it was empowered to form a library and a museum, and in 1826 it removed to the Royal Institution building in Prince Street. The meetings of the society are held every first and third Monday of each month, from November to June, and a volume of its *Transactions* comes out as often as the number of papers which are thought worthy of being printed are sufficient to make one. Abstracts of papers and obituary notices of the deceased fellows appear in the *Proceedings*. The original list of members included the names of most of the literati of Scotland, and the list of presidents, who are elected for five years, includes men of the highest eminence in science and literature. The admission fee of resident fellows is £2 2s., and the annual subscription £3 3s., which is reduced to £2 2s. after ten years' membership,

and ceases altogether after twenty-five years. The society has the disposal of some valuable prizes, which are bestowed on the authors of the best communications on scientific and other subjects.

ROYAL SOCIETY OF LONDON. This, the leading scientific society of Europe, and, with the single exception of the Academy of the Lyncei at Rome, the oldest in existence, owes its origin to the formation of a little club of learned men in London, about the year 1615. In 1652 two of the members of this association, having removed to Oxford, established a similar association there, and in 1659 the two societies thus formed united and held their meetings in London. After the Restoration formal rules were drawn up for the government and support of the association, the subscriptions being fixed at 1s. weekly from each member, with 10s. entrance fee, the elections to be by ballot. In 1662 Charles II. granted a charter, by which the members were incorporated into a society, consisting of a president, council, and fellows under the name of the Royal Society, and William Viscount Brouncker was appointed president. This charter being found not sufficiently explicit, in the following year another was obtained, in which the president and fellows are designated the President of the Council and the Fellows of the Royal Society of London for promoting national knowledge. In 1661 the king signed himself in the charter book as the founder of the society, and at the same time the Duke of York (afterwards James II.) signed himself a fellow.

From the time of the granting of the charter the business of the society assumed more importance, and in 1661 Dr. Hooke was appointed curator. On the 1st of March, 1664-65 it was ordered, at a meeting of the council, "that the *Philosophical Transactions* to be composed (edited) by Mr. Oldenburg, be printed the first Monday of every month if he have sufficient matter for it," and in conformity with this order the first number appeared on Monday, 6th March, 1665. The *Transactions*, which have been regularly continued ever since, contain an immense number of valuable memoirs by the most eminent men who have appeared since the foundation of the society, and they form, perhaps, the most valuable repository of scientific research in existence. From the commencement in 1665 to the year 1800, the work consisted of ninety volumes. Since that date a volume has been issued annually. The *Proceedings of the Royal Society* is a supplementary and smaller work, the publication of which was commenced in 1800. Each fellow receives a copy of all the parts of the *Transactions* and *Proceedings* published since his election, and they are also sent to numerous societies and institutions all over the world. The *Catalogue of Scientific Papers* is also an important publication regularly issued by the society.

The first meetings of the society were held in Gresham College, but in 1701 it removed to a spacious house in Crane Court, Fleet Street, which afforded room for the meetings, for the library, and for the museum of curiosities. Here the reading of papers, exhibition of experiments, &c., took place as before, till the year 1780, when the government assigned to the society apartments in Somerset House. In 1857 it removed to the old Burlington House, Piccadilly, and it is now accommodated in a wing of the new Burlington House. The library of the society, which extends to some 40,000 volumes, is peculiarly rich in scientific books and journals, and its rooms contain numerous busts of past presidents, and a number of portraits, some of great interest, of eminent scientific men.

For many years after its foundation the Royal Society was the sole depository of science in Great Britain, and the numerous associations which have since been formed for special branches of science may rightly be considered as its offspring. Throughout the whole of its existence it has zealously and generously supported scientific research,

investigation, and discovery, many valuable additions to the store of human knowledge having been secured by its instruments, its influence, and its money. Honorary recompenses have also been liberally bestowed by the society on persons distinguished by their discoveries in pure science or in philosophy. For this purpose it has received several important bequests, the chief of which are—(1) the Copley medal, founded by Sir Godfrey Copley in 1730; (2) the Rumford medal, founded by Count Rumford in 1800; and (3) two royal medals, founded by George IV. in 1826. It has also a donation fund, several trusts bestowed by private benefactors, and the control of a sum of £1000 (which is sometimes increased) annually voted by Parliament for scientific purposes.

The meetings of the society take place weekly, from the third Thursday in November to the third Thursday in June, at 4.30 p.m., this hour having in recent years been substituted for the time-honoured 8.30 p.m. The number of fellows, including fifty foreign, is about 510. The anniversary meeting is held on St. Andrew's Day, when the council of twenty-one members and the officers are elected. Fifteen gentlemen, each of whom must be recommended by at least six fellows, three of whom must have personal knowledge of the candidate, are selected annually by the council from the list of candidates for admission and recommended for election as fellows, the election taking place on the first Thursday in June. As fellowship in the Royal Society is regarded as a distinguished honour, there are always many more candidates for admission than the fifteen selected. The voting is by ballot, and in addition to an entrance fee of £10 there is an annual subscription of £3. See Bishop Sprat's "History of the Royal Society," published in 1667; and Weld's "History of the Royal Society," published by Parker in 1848.

ROYAL SOCIETY OF MUSICIANS was founded in 1738 by Festing the violinist and Weidemann the flautist, to aid distressed musicians and their families. Directly the idea was started Handel in his generous way warmly took it up, and Boyce, Arne, Christopher Smith, Greene, Pepusch, &c., joined at once. In all there were over 200 members enrolled. Handel supported the society in every way, by his great influence, by writing and conducting for it, and at last by leaving it £1000 in his will. Even then his benefits did not cease, for the Handel celebration of 1784, in Westminster Abbey, brought in £6000 to the charity. About £3000 a year is paid away in charity by this excellent society, which manages to get most of its work done for nothing, so as to leave practically all its revenue for distribution. The Royal Female Society of Musicians, founded by Mrs. Anderson, Miss Dolby, and others, in 1839, because only male members were allowed in the older society, was amalgamated with the latter in 1866, owing to a happy modification in the royal charter which was then made, enabling women to join the society.

ROYALTY, originally a tax to the king on certain products, as mines, manufactures, imports, or exports. The word now takes a general signification, and comes into the category of a rent, varying with the rate of production. Thus a mine-owner lets his mine at a royalty of so much a ton of coal or ore produced, a patentee lets his invention at a royalty of so much for each article manufactured under the patent, and a musician or an author lets or perhaps parts with his copyright for a royalty paid by the publisher of so much a copy. A curious species of royalty is that paid to famous singers who consent to take up a song and introduce it wherever they can, on payment of a small royalty to them by the publisher on each copy sold, the presumption being that this is the best way of advertising the song and introducing it to the public. Considerable sums are sometimes realized in this manner, far more than the author has himself received. The evil

of this system lies in the readiness of artists to sing inferior music which pays, and their reluctance to sing fine works on which they cannot obtain royalties.

ROY'AT, a town of France, in the department of Puy de Dôme, about 2 miles from Clermont, has, owing to the beautiful scenery of this volcanic region and its re-opened Roman baths, with a temperature of 55° Fahr., become a fashionable watering-place. There are some fine new houses and an ancient church which has features of interest. The population is about 2000.

ROY'STON CROW. See CROW.

RU'ABON, a town of Wales, in the county of Denbigh, situated at the junction of the two roads from Oswestry and Llangollen to Wrexham, 17 miles S.S.W. from Chester, and 196 N.W. of London by the Great Western Railway. The church is spacious, and is adorned by some elegant monuments of the Wynne family, especially one by Rys-bræck. There are some extensive coal-fields in the neighbourhood, and also some ironworks and quarries, which combine to give the village a busy and prosperous appearance. The population of the township in 1881 was 15,184.

RUBATO, a musical term, a contraction of *tempo rubato*, that is, "stolen time." It indicates a momentarily hurried style of performance, one note treading on the heels of the other, as it were, so that the proper time is stolen from it; but it differs from *accelerando* in that the time is not quickened on the whole, for the hurried effect at one part of the bar or phrase must in *rubato* be compensated by a corresponding tardiness in the remaining part.

RUBBLE, a quarryman's term applied to accumulations of angular rock fragments that have not been subjected to the eroding action of water. It originally had reference to the mass of loose scattered fragments so frequently observed at the outcrop of a sandstone.

RUBBLE WORK or **RUBBLE WALLING**, walls built of rubble stones. Rubble walls are either coursed or uncoursed; in the former the stones are roughly dressed, and laid in courses, but without regard to equality in the height of the courses; in the latter the stones are used as they occur, the interstices between the larger stones being filled in with smaller pieces. A rubble-heap is a mass of rough stone thrown into the sea, so as to form a mound for the base of a BREAKWATER or SEA-WALL.

RUBEFACIENTS are external agents which cause redness of the part to which they are applied. If long continued they may, according to their nature, produce inflammation and some of its consequences. In such circumstances they are termed *blisters* or *escharotics*. It is, however, a degree of action short of what entitles them to these appellations to which this term is most frequently applied. Thus, friction with the hand or warm cloths often relieves spasmodic or neuralgic pains; and hot poultices or warm fomentations lessen inflammation of superficial or even deep-seated parts. Mustard, oil of turpentine, Spanish fly, Cayenne pepper, and other applications are also useful for this purpose. Embrocations, when of a stimulating kind, act as rubefacients; and blisters kept in contact with the surface for a short time only cause redness of the part, and some remote secondary effects of a beneficial kind.

RUBENS, PETER PAUL, the most celebrated painter of the Flemish school, which he completely revolutionized, was born at Siegen, in Westphalia, 29th June, 1577. In his sixteenth year, after the death of his father, who was one of the *scholars* of Antwerp, Rubens was placed as a page in the household of the Countess of Lalaing in that city, but he soon returned home. At his own desire he became the pupil, first of Tobias Verhaeght, then of Adam van Noort and Otho van Ven. In 1600, when he was twenty-three years old, he proceeded to Venice, and thence to Mantua, where he accepted the place of gentleman of the chamber at the court of the

Duke Vincenzo Gonzaga. In 1601 he repaired to Rome for a short time, and after returning to Mantua visited Venice and devoted himself to the study of the pictures of Titian and Paul Veronese. The Archduke Albert commissioned him to paint three pictures for the Church of Santa Croce in Gerusalemme at Rome, and in 1605 the Duke Vincenzo Gonzaga sent him on a special mission to Spain with a present for Philip III. That king received him most graciously, and after painting a large number of portraits of persons connected with the court of Madrid, he returned to Mantua. He paid a third visit to Rome, and in 1607 went through Milan to Genoa. In the latter city he executed many works, and a great number of his pictures still remain there. In 1609 Rubens married his first wife, Elizabeth Barylt, and settled at Antwerp, receiving the appointment of court-painter to the Archduke Albert. Here he founded a large school, and trained a great number of pupils. The beautiful picture in the Munich gallery, representing himself and his wife seated in a garden, was probably painted shortly after his marriage. In 1620 he was commissioned to paint the series of large pictures, now in the Louvre, which represent the principal events in the life of Marie de Medici. He went to Paris, and received his instructions for these works, but the pictures themselves were executed at Antwerp. His pupils, preparing large parts of the finished pictures. During his last residence at Paris he became acquainted with the Duke of Buckingham, who purchased his collection of statues and other works of art for 60,000 francs. In 1626 he returned to Antwerp. Shortly afterwards he made a journey, which he visited the principal Dutch contemporary painters.

In 1627 when Charles I. declared war against France, Rubens, who was in favor with the Infanta, widow of the Archduke Albert, was intrusted with some negotiations with Cardinal Richelieu at the Hague. In the autumn of the same year he was despatched to Madrid. During his stay in Spain he executed several very fine pictures, and gained the confidence of Philip IV. and the count-duke of Olivarez. In 1629 he was sent by the Infanta as ambassador to England. While in England he was much encouraged by Charles I. The allegory of "War and Peace," now in the National Gallery, was painted as a present to the king on the occasion of these negotiations. The ceiling of Whitehall was sketched during his stay in England, and painted at Antwerp at a later period. In 1631 Rubens married his second wife, Helen Fourment, a beautiful girl of sixteen. Her portrait often occurs in his pictures. She bore him two children. He was again employed on missions to Holland in 1633, and in December of that year his patroness the Infanta Isabella died. His grief was so great, and his death so rapidly approaching, that he could only be comforted by the aid of his numerous pupils. At least 150 pictures, of the nearly all of great size, are engraved; and these are supposed to be the total number. He expired in 1640, and was buried in St. James' Church, Antwerp.

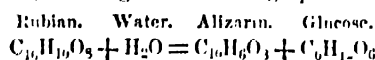
His practice of dissection for purposes of study, and his manner of treating the human body, can generally be held as a model for all artists. He treated with the greatest generosity. His own character and mind, as a painter, have been the subject of much controversy, and will probably always furnish matter for discussion. In the parts of his art which act immediately on the senses, Rubens was without doubt a great master. He understood the perfect management of light and shade of composition, and of colour. His are admitted as comparable to those of Michelangelo himself. So the late Reynolds says that "no other great workman with his tools that ever executed a picture." His hands were deft, it is with reason that the subjects and to his mode of treating them, and to his technical skill.

The picture most commonly referred to as his *chef-d'œuvre* is the "Descent from the Cross," in the cathedral at Antwerp, in which city the thirtieth anniversary of his birth was celebrated with great splendour in 1877. The best of his works are in the Munich gallery, at Antwerp, at Paris, and at Vienna. In England the painter is well represented. Fourteen of his pictures are in the National Gallery, and several are to be found in all the great private collections. Vandyck and Jordans were among his pupils.

RUBIA'CEÆ is an order of plants belonging to the **GAMOPETALÆ**. It is an extensive order, its chief characteristics being opposite leaves with interpetaloid stipules; stamens attached to the corolla, and alternate with its divisions; and ovary syncarpous and inferior. The order takes its name from the genus *Rubia*, which name is derived from Lat. *ruber*, red, in allusion to the red colour yielded by many of the species. Several are employed in medicine and in the arts, in the latter for the sake of the coloring matter which is contained in the roots. *Rubia tinctorum* (MADDER) has been long known, and was employed in medicine even in the time of Hippocrates, but is valued chiefly as a dye. *Rubia cordifolia*, the *murex* of India, possesses similar properties. There are several other genera, which include plants of great economic importance. The bark of species of *Cinchona* yields QUININE. Substitutes for the Peruvian bark are found in species of *EXOSTEMMA* and *Remyia*. **IRICA'VANNA** is obtained from the roots of *Cephaelis*, and a substitute from those of a *Girardinia*. *GIRARDIA* yields a valuable fruit, and species are cultivated as stove plants. An allied genus, *GARDINIA*, is well known for its beautiful fragrant flowers. The species of *IXORA* are shrubs much cultivated for their ornamental flowers. *MYRMECODIA* and allied genera are remarkable for the shelter they afford to ants, forming a kind of "living ant's nest." Many of the *GALUMS* yield a red dye.

RUBIACIN or **MADDER ORANGE** is a yellow colouring matter found in madder, *Rubia tinctorum*, natural order *Guttiferæ*. It crystallizes in pale yellow needles, with a reddish-green lustre. It is soluble in alcohol, but insoluble in water. When heated it sublimes unchanged. The formula is $C_{22}H_{22}O_{10}$. It dissolves in oil of vitriol, and the solution may be heated without decomposition. It forms purple solutions with alkalis, from which rubiacin is thrown down by acids in yellow flocks. By the action of alkalis it is converted into glucose and rubiadim ($C_{10}H_{14}O_5$). This substance crystallizes in yellow needles, is insoluble in water, but soluble in alcohol. It forms blood-red solutions with the alkalis. When rubiacin is boiled with ferric chloride it is converted into rubianic acid ($C_{14}H_8O_{17}$), which may be precipitated from the solution by hydrochloric acid. It is a yellow powder; and forms a potassium salt crystallizing in red needles and having the formula $C_{14}H_8KO_{17}$.

RUBIAN, a glucoside found in madder root, having the formula $C_{16}H_{16}O_8$. It is a dark brown powder, soluble in water, and very bitter. In the presence of alkalis it is converted into rubianic acid ($C_{20}H_{10}O_{14}$), which crystallizes in yellow needles, having a bitter taste. Under the influence of dilute acids rubian is split up into alizarin and glucose, according to the following equation:—



RUBICON (Lat. *Rubico*), a small river which separated Italy from Cisalpine Gaul, the province allotted to Caesar. When Caesar crossed that stream he invaded Italy with the intention of reducing it to his power. Hence the phrase to *pass the Rubicon* signifies to take a desperate step in an enterprise, or to adopt a measure from which one cannot recede, or from which one is determined not to recede. It is identified with the modern *Pisatello* near Rimini.

RUBIDINE is one of the bases found in coal tar. The name is derived from the salts assuming a reddish colour on exposure to the air. It is a colourless oily body, having a specific gravity of 1.017; and is slightly soluble in water, very soluble in alcohol, ether, and oils. The formula is $C_{11}H_7N$. It boils at $230^{\circ} C.$ ($446^{\circ} Fahr.$), produces a red colour with chloride of lime, and forms crystalline salts with acids. The double chloride with platinum is a reddish crystalline powder. It also forms double chlorides with mercury and gold.

RUBIDIUM, a rare element belonging to the potassium group, and first discovered by Bunsen in 1860, by spectrum analysis. The spectrum is distinguished by two bright red lines; hence the name. It was first discovered in the mineral water of Dürkheim, and has since been found in several other mineral waters, with cesium and lithium. It is also found in lepidolite, lithia mica, and other lithia minerals; likewise, in minute quantity, in tobacco, coffee, tea, and cocoa. Rubidium is obtained by electrolysis of the fused chloride, but it may also be made by heating the tartrate with soot; the metal volatilizes, and is collected in mineral naphtha. It is a white silvery metal, having the specific gravity of 1.52; is soft at ordinary temperatures, and melts at $38.5^{\circ} C.$ ($101^{\circ} Fahr.$); and at a higher temperature forms a greenish-blue vapour. It is quite as dangerous to handle as potassium, taking fire on water and burning in the same way. It also ignites with chlorine, iodine, and bromine, and is a violent reducing agent. The symbol is Rb, the atomic weight 85.4. The hydrated oxide of rubidium ($RbHO$) resembles hydrate of potash. It melts at a low red heat, dissolves in water with great rise of temperature, and deliquesces into a corrosive caustic liquid. The carbonate (Rb_2CO_3) and the acid carbonate ($RbHC O_3$) resemble the corresponding carbonates of potassium. The chloride ($RbCl$), the bromide ($RbBr$), and the iodide (RbI) all crystallize in cubes like the potash salts. The same may be said of all the other salts, which so closely resemble those of potassium that ordinary analysis fails to detect the difference. The spectrum results are, however, exceedingly delicate and conclusive; the two strong red lines beyond Fraunhofer's A will be visible with only $\frac{1}{100}$ of a milligramme of rubidium. It can be separated from potassium by the greater insolubility of the platinum salt, the chloroplatinate of rubidium ($2RbClPt_4Cl_4$), which, in a mixture of the two alkalies, is thrown down first.

RUBINI, GIOVAN'NI BATTIS'TA, the greatest tenor singer of modern times, was born near Bergamo, in 1795. He sprang into fame in 1825 at Paris, in Rossini's operas, but his special glory came a few years later from his intimate association with his friend Bellini, with whom he frequently stayed during the composition of an opera, so that his part might exactly be fitted to his voice. Rubini first came to England in 1831, and continued to divide his time between the operas of London and Paris from that year to his retirement in 1843. He died at Romano, his native place, in 1854, leaving behind him the largest fortune ever amassed and kept on the operatic stage.

Rubini's compass was very great, and his command of the headvoice and falsetto superb. In florid execution he was unrivalled, but he was equally master of simple pure expression. He could sing passages of vast length without its being noticeable when he took breath, but though gifted with such power of lungs he was never a loud singer. His voice was meltingly sweet and full. In person he was short, not handsome nor graceful, and he was not a good actor. He enthralled his audience by the flawless finish of his art—by absolute singing. One legacy of disaster he left to the stage. He invented the use of the vibrato, which he used as a delicate thrill of the voice in moments of great expression; and in his later years he in-

creased its use to cover deficiencies in his voice. Imitators have worn the device threadbare, to the ruin of their own voices and their listeners' ears.

RUBLE or **ROUBLE**, the Russian unit of monetary value, containing 100 kopeks. The gold ten-ruble piece, called an imperial, weighs 13.088 grammes, .916 fine, which make the ruble worth 3s. 3½d. English. The silver ruble, 20.735 grammes, .868 fine, was long taken as worth a small fraction over 3s. 2d. English, but since 1851 it has recently fluctuated so much that its precise value cannot be given. The paper ruble (inconvertible) is the legal currency of Russia, and before the war of 1877 generally fetched 2s. 6d.; the war brought it down to 1s. 10d., after which it recovered considerably, but the heavy (though concealed) annual deficits of the Russian treasury caused it again to become greatly depressed in value, so that in 1886 it fell as low as at the period of the war.

RUBRIC (from the Latin *rubrica*, a kind of red earth or stone), a name given to the titles of chapters in certain ancient law books, and more especially to the rules and directions laid down in our Liturgy for regulating the order of the service. These, in both instances, were formerly written or printed, as the case might be, for distinction's sake, in red characters, and have retained the name, though now printed in black. In the Latin language *rubrica* is used in a similar manner. It signifies a heading or title of the things which are contained in a law or in an edict.

RUBRUQUIS, WILLIAM DE, one of the most distinguished of the mediæval travellers, was a friar of the Minorite or Franciscan order. His real name was Ruysbroek or Ruysbrack which he Latinized into Rubruquis. He was probably born about 1228. Soon after completing his novitiate and taking the major vows he went to the Holy Land with other monks and missionaries. The French king, Louis IX., who was in Palestine in 1253, sent a mission, consisting of Rubruquis, Iwan Bartholomew of Cremona and a friar named Andrew, in search of the great Tartar, Saitsch, son of Batu Khan, who was supposed to be the great undiscoverable Christian potentate Prester or Priest John. [See PRESTER JOHN.] Accordingly, the three, after spending a short time at Constantinople, took shipping, and were safely landed at Soldania, now Souday or Soujay, in the Crimea, on 21st May, 1253. After a long journey of danger, fatigue, and privation, they reached the encampment of Saitsch, which was situated several days' journey east of the river Don, on 2nd August. Here they were but ill received, and discovered the chief's Christianity was a dream. At last, on 27th December, the poor monks arrived at the camp and court of the Tartar emperor, Mantchu Khan, and were lodged in a small dirty hovel.

On Whitsunday, 1254, Rubruquis was called into the presence of the emperor, and told that he must return the way he had come. After a very remarkable journey he reached Tripoli in Syria, in August, 1255. He had been, altogether, about two years and six months on his laborious travels, and he now besought his superior to allow him to go to King Louis at Paris. But the Franciscan provincial, being a strict disciplinarian, ordered the poor friar to write to Louis, and then retire to the convent of his order at Acre. The manuscript account of the travels was soon transmitted to Paris, and nothing more seems to be known about Rubruquis except that he was living as late as the year 1293. He was a man of rare good sense, the sobriety of his descriptions is marvellous for the time in which he lived. He was the first European traveller that gave a correct account of the Caspian Sea.

RUBUS. See BRAMBLE.

RUBY is one of the more precious gems, of a red colour, belonging to the CORUNDUM group of minerals. It consists of almost pure alumina, possibly tinged with some

salt of chromium, and crystallizes in six-sided prisms of extreme hardness, which are only capable of being scratched by the diamond. Like its numerous allies—the sapphires, “Oriental topazes,” and “Oriental emeralds”—the stone becomes readily electrified by friction, and is not acted upon by acids or injured by considerable heating; a high temperature, in fact, is sometimes employed to render its colour more intense. It is also one of the few gems that have been successfully manufactured in the laboratory by chemical means, MM. Fremy and Fiol having obtained crystals indistinguishable from those occurring in nature.

Rubies are chiefly discovered in a more or less rolled condition in alluvial deposits in the East Indies, where they occur associated with sapphires and other precious stones. The most extensive workings are in the island of Ceylon and the kingdoms of Pegu and Burma, and the sandy deposits of ruby earth are rarely more than 2 or 3 feet in thickness; they are mined partly by lateral drifts from the valleys and partly by vertical shafts. The smaller stones are usually the more perfect, larger examples almost always exhibiting flaws.

The true ruby was well known to the ancients, and is supposed to have been the fine gem described by Pliny under the name of *Lychnis*. In modern times, however, minerals of a totally distinct character have been designated as varieties of the gem, notably the Ruby Spinel, Balas Ruby, and Almandine Ruby; these are differently coloured examples of SPINELL.

RUBY COPPER is a common name applied to the more crystalline varieties of COPPER (oxide of copper), from their superficial resemblance to the well-known gem.

RUBY-TAILS. See CHRYSIDAE.

RUDD (*Leuciscus erythrophthalmus*) is a species of fishes belonging to the CARP family (Cyprinidae), and the same genus as the dace, chub, roach, &c. It is widely distributed in fresh waters throughout Europe and Asia Minor, and occurs in many of the rivers of Britain, being numerous in the Norfolk Broads. The rudd owes its name to its general golden-copper colour; the back is darker, tinged with green and blue. It is also called the Red-eye, from the colour of the irides. In the Cam it is known as the Shallow. The body is deep, and covered with large scales; the dorsal fin is placed far back. A large specimen is only a little over a pound in weight. The flesh is considered good for the table. It sometimes produces hybrids with the roach.

RUDOLPHINE TABLES, a set of astronomical tables composed by Kepler, and founded on the observations of Tycho Brahe (1591–27). They were so named in honour of the Emperor Rudolph II., king of Bohemia.

RU DOLSTADT, a town of Germany, the capital of the principality of Schwarzburg-Rudolstadt, on the left bank of the Saale, 20 miles south of Weimar. It is walled and well built, surrounded by gardens, and has two castles, in one of which the prince resides. There are some manufactures of woollen and leather, and a trade in fruit. The population in 1880 was 8747.

RUE (*Ruta*), the name of a genus of plants belonging to the order RUTACEÆ. The genus contains about forty species. The species which has been longest known and most used, and perhaps the hardiest for culture, is the Common Rue (*Ruta graveolens*).

Rue is a native of the Mediterranean region and Western Asia. It is a glaucous erect herb or half-shrubby plant, of a peculiar yellowish-green colour. The leaves are pinnately divided; they and all parts of the plant are marked by transparent dots, filled with volatile oil. The leaves and immature fruits are officinal, and owe their virtue to the volatile oil and a bitter extractive. The odour is peculiar, strong, and penetrating; the taste intensely bitter, aromatic, and stimulating. Rue possesses power-

ful stimulant, antispasmodic, and tonic properties. The careless handling of the fresh plant sometimes causes rubefaction and vesication, and its improper employment internally has produced serious results. When judiciously used it is very serviceable in hysteria and other convulsive disorders.

Rue is sometimes called Herb of Grace, and in some parts of England Ave Grace. This name is said to have been given to it on account of its use in exorcisms. In company with rosemary it has been used from time immemorial as an emblem of remembrance on account of its evergreen foliage.

Rue is frequently cultivated as an ornamental plant, for which its curiously cut leaves, their glaucous hue, and the profusion of fine dark yellow flowers appearing for several months in succession, adapt it exceedingly well. It may be increased by seeds, slips, or cuttings. In the genus *Ruta* the calyx has four divisions; there are four unguiculate petals; eight stamens; disc marked, with eight nectariferous pores; ovary four-lobed, styles united above; capsules, four, partially coherent; seeds dotted, six to eight in each cell. Meadow Rue is the name of a species of Thalictrum which belongs to the Buttercup family (RANUNCULACEÆ). These plants possess none of the properties of common rue.

RUE, OIL OF, the volatile oil obtained from rue, *Ruta graveolens*, natural order Rutaceæ, by distillation with water. It is a viscid oil, with strong disagreeable odour. It has a specific gravity of 0.837. It boils at 228° C. (112° Fahr.), and crystallizes at the freezing point of water. It is used in medicine as an antispasmodic and emmenagogue, also as a stimulant and rubefaciant. Rue was used by the ancients to strengthen the eyes.

RUFF (*Machetes pugnar*) is a species of the Snipe family (Scolopacidae). The ruff is a native of the northern parts of Europe and Asia, migrating southwards for the winter. Of late years the number of those breeding in this country has become very scanty. It frequents marshes. The bill is as long as the head, straight and slender. The wings are long and pointed. The legs are long and slender,



Ruff (*Machetes pugnar*)—male (in summer plumage)

the tibia being naked for some distance above the tarsal joint. The male is about 12½ inches in length. In the breeding season his plumage is distinguished by a ruff of long feathers covering the neck, and two thick tufts of feathers springing from the sides of the head. The face is covered with small fleshy excrescences. The ruff and ear-tufts disappear in winter, as do also the excrescences. It is a very remarkable circumstance that in no two individuals is the colour of the ruff (and indeed of the general nuptial plumage of the male) alike, nor in the same bird for two successive years. The ruff may be seen jet black, rufous brown, yellow barred with black, white barred with

black, mingled white, black and brown, &c. The general colour of the plumage is ash or chestnut brown, spotted with black, the belly and rump being white. The female (or Reeve) is plain in her attire, and a third less in size than the male.

In habits the ruff (male) is polygamous, and highly combative. Shortly after the arrival of the flocks at the marshes, each male arrogates to himself a territory called his *hill*, round which he moves awaiting the approach of any of the other sex, whose appearance acts as the signal for a general fight, for bold intruders now rush forward from adjacent spots and invade his territory, and the battle rages until the lord of the hill drives back his invaders, or is put to flight, the favours of the female being granted to the ultimate victor. This scene continues day after day during the month of May and the early part of June. Every night the males disperse among the marshes to feed, returning each to his petty territory about dawn. They feed on worms, insects, and their larvæ. The nest, made of coarse grass, is situated in a hollow on the ground, and contains three or four eggs, green in colour, spotted with brown. The flesh is greatly esteemed for the table. These birds are taken alive in nets and fattened for the market.

RUFF, a large collar of lace or plaited or rolled muslin, cambric, or lawn, standing out from the neck. Ruffs began at the end of the reign of Henry VIII., but reached their culmination under Elizabeth, when both men and women wore them. They were propped up and kept stiff when at their greatest size by a framework of wire, and were also stiffened by the newly invented article starch, "the devil's own liquor, I mean *starche*," as Stubbs indignantly called it in his "Anatomic of Abuses." Under James I. the ruffs lessened in size, and were replaced under Charles I., as to the men, by a falling Vandyke collar.

RUFFE or **POPE** (*Acerina cernua*) is a species of fish belonging to the Perch family (Percidæ). The ruffe is found in the lakes and slow rivers of England and Central Europe. In habits and appearance it resembles the common perch, but has only one dorsal fin. The upper part of the body is a light olive-brown, passing into silvery-white on the belly. It attains a length of 6 or 7 inches. The flesh is highly esteemed for the table.

RUFUS, WILLIAM. See **WILLIAM II.**

RUG'BY (anciently *Rochebyrig* or *Rochebyrie*), a market-town of England, in the county of Warwick, 83 miles from London, with a busy station on the North-western and Midland railways, stands on an eminence near the south bank of the Avon, and consists of several streets irregularly laid out, containing numerous well-built and substantial houses. The importance of the town is chiefly derived from its grammar-school, founded in 1567 by Laurence Sheriff, a grocer of London and a native of the neighbouring village of Brownsover. The school buildings form a quadrangle, inclosing a court 90 feet long by 75 wide, surrounded on three sides by open cloisters. The principal front, towards the south, extends 220 feet. They were erected early in the present century, from the designs of Mr. Hakewell, and are in the Elizabethan style, of white brick, with the angles, cornices, and dressings to the openings and windows of Attleborough stone. The chapel contains monuments to Dr. James and Dr. Arnold, headmasters of the school, to the latter of whom it owes its great reputation. Under his superintendence it rose from a comparatively decadent condition to a position of the highest celebrity, and the system which he inaugurated extended its beneficial influence far and wide. The renown of the school was well maintained by his successors, Dr. Tait (late archbishop of Canterbury), Dr. Goulburn, and Dr. Temple. The average number of boys in the school is 500, of whom about fifty are upon the foundation. The endowment produces about £6000 per annum. School life at Rugby has been admirably portrayed in Mr. Hughes'

well-known fiction, "Tom Brown's School Days." The buildings have been greatly added to and improved since the tercentenary of 1867, and the chapel has been rebuilt. Rugby Church, almost rebuilt in 1878, has a square western tower, without buttresses and devoid of ornament. There are several district churches, a park, and an hospital. Among the other noticeable buildings are a Roman Catholic church, Wesleyan and Baptist chapels, Laurence Sheriff's almshouses, the town-hall, and Elborow's charity school. About 2 miles distant is Bilton Hall, once the residence of Addison. The population of the town in 1881 was 9890.

RUG'BY, an English settlement in Tennessee, United States, founded in 1880 by Mr. Thomas Hughes to encourage the emigration of young Englishmen, and named after the public school of Rugby. It has a central position in the States, and is easily accessible from Cincinnati, Pennsylvania, and Chicago on the north, and from Alabama and Georgia and New Orleans on the south.

RUGELEY, a market-town of England, in the county of Stafford, 9 miles E.S.E. from Stafford, and 121 from London by the North-western Railway. It stands on the river Trent, which is here crossed by an aqueduct of the Grand Junction Canal. The town is irregularly laid out, but is well drained and has a remarkably clean and respectable appearance. The parish church is a modern Gothic building of good design. There are several denominational chapels, a Roman Catholic church, public buildings, including a town-hall, a mechanics' institute, library, &c. The grammar-school, founded in the reign of James I., has been much increased in usefulness under a scheme of management which came into operation in 1875. The manufactures are brass and iron goods, and in the neighbourhood are some extensive collieries. The population in 1881 was 4249.

RU'GEN, an island in the Baltic, included in the Prussian province of Pomerania; it has an area of 388 square miles, and a population of about 50,000. It is separated from the Continent by an arm of the sea extending from half a mile to 2 miles broad. It is deeply indented by the sea, and has the appearance of a number of peninsulas united by a small nucleus in the centre. On the east side is the peninsula of Jasmund, which is connected with the central part by a steep rocky ridge. The whole island abounds in romantic scenery. On the west it is level, but rises in the interior, and the northern coasts consist in general of rugged steep chalk cliffs. One of the most considerable eminences in the island is Mount Rugard, on which the residence of the princes formerly stood. On the north point of Jasmund is the Stubbenkammer, a lofty chalk cliff, which rises about 500 feet perpendicularly in the sea in the most irregular forms. The Jasmund is connected by a narrow strip of alluvial soil with another peninsula called Wittow, a level tract with a rich soil, terminating in the promontory of Arkona, the most northern point of Germany, upon which a lighthouse has been erected. Rugen contains some antiquities, among which are several tumuli, and in a beech forest of Jasmund there is a spot surrounded by a high wall, supposed to have been connected with the worship of the goddess Hetha. The soil of the island is in general fertile, and produces much corn. The number of cattle is considerable, and the fisheries productive. The inhabitants are primitive in their habits and manners, frugal, and industrious. They are principally of the reformed religion, and their language is a patois of low German, intermixed with Swedish. Owing to the picturesque scenery and the facilities for sea-bathing, Rugen is the resort of numerous tourists in the summer. Bergen, the capital, is situated in the centre of the island. Some manufactures of woollen cloth and brandy are carried on here.

RULE OF THREE, the old-fashioned rule of arithmetic which teaches how to find a fourth proportional to three terms by multiplying the middle term and dividing

the product by the fist. It is in fact one branch of PROSESSON, and the reason of its operation is thoroughly investigated in that article. The name is, fortunately, beginning to become antiquated, and the proper term, proportion, to replace it.

RUM (*U. thom*) is a spirit obtained by distillation from the fermented skinnings of the sugar boilers, the treacle or molasses that drains away from the crystallized sugar, or the washings of the boilers, &c., mixed with the fresh juice of the cane. The best liquor for distillation is that obtained by dissolving the syrup scum in water, the spirit obtained from the other sources being of inferior quality. It contains from 12 to 16 per cent. of saccharine matter, and fermentation is allowed to proceed for several days before the "wash" is transferred to the still. It takes about 10 gallons of the sweet liquor to make a gallon of rum. The flavor of the spirit depends mainly upon soil and climate, and is not good where the canes grow rankly. Like all other spirit, rum is colorless when it leaves the still, and the colour denuded by the taste of the consumer is obtained by the use of burned sugar. As reported into this country the average strength is about 20 o. p. The peculiar flavor of rum is due to butyric ether, and the spirit improves greatly with keeping. In Jamaica it is usual to put sliced pine-apples in the punch-bens containing the finer qualities of rum, the liquor being turned in consequence pine-apple wine. The spirit is distilled generally in conjunction with the molasses of sugar in the East and West Indies. Great Rumors, Tahiti, &c., but the best of it comes from Barbados, and is hence distinguished by that name. The word is of unknown origin, but most probably it is a corruption of the Malay *rum*, which is a native fermented liquor made from burnt palm-sugar and fermented rice.

The duties duty on rum imported into the United Kingdom is 19s. 2d. per gallon. The quantity imported in 1855 was 6,999,250 gallons valued at £516,889, or only about 4s. 7d. per gallon. The quantity retained for home consumption was 3,828,808 gallons.

RUM SHRUB, a liquor composed of rum, sugar, fresh juice of lime water, to which the rind of lemon or lime is added as a flavoring material.

RUMEX, name of a genus of plants, from Lat. *rumex*, a sort of spleen-spear, or hulkard, when the shape of its leaves resembles. It belongs to the order POLYCOXYTRI. Most of the species of this genus are well known as troublesome weeds to the agriculturist under the names of dock and sorrel. Some of them have been used in medicine as *Rumex Acetosa* and *Rumex Hydrolapathum*, but their feeble powers and inconstant appearance have caused their almost entire neglect in the garden. *Rumex Acetosa* (common sorrel) is indigenous in this country, and it is also common in meadows and grassy places throughout Europe, from Lapland to Greece. It is very early sown. It was formerly cultivated in gardens for medicinal uses, but after the introduction of the French sorrel (*Rumex scutellatus*), in 1596, it fell into disuse. The French sorrel is very common. It is a pity that it is not more used in this country, as it is wholesome and antiscorbutic. *Rumex Hydrolapathum* (great water dock) is found growing in marsh-land, ditches, stagnant waters, and the margins of great rivers throughout Europe, as well as North America from Pennsylvania to Virginia. It is by far the largest and most conspicuous of our indigenous dock-flowering from July to August.

RUMFORD, SIR BENJAMIN THOMPSON, COUNT, was born in 1752 at Woburn, Massachusetts. He settled as a schoolmaster in Rumford (now Concord), N. H., where an advantageous marriage gave him leisure to pursue scientific studies for their own sake. On the outbreak of the Revolution he espoused the cause of

the mother country, raised a regiment of dragoons, and was appointed lieutenant-colonel. On his return to England in 1781 he was knighted by the king. Travelling on the Continent soon after, an acquaintance he formed with some members of the reigning family in Bavaria led to his appointment to an important office in Munich. He introduced many salutary reforms into the system of military administration in Bavaria, grappled boldly with the social evil of mendicancy, which threatened to overgrow the entire state, and established a poor law which was at once strict and truly humane. He introduced the potato into general use in Bavaria, and promoted domestic economy among the people by the invention of stoves, and by disseminating instructions for the preparation and cooking of food. He returned to England in 1799, having been ennobled by the Duke of Bavaria with the title of count. Warming and ventilation of houses continued to occupy his attention, and his improvements in chimneys and fireplaces were generally adopted throughout the United Kingdom. In 1796 he was elected a fellow of the Royal Society, to which he gave £1000 in trust for the reward of any discovery of a new scientific truth with respect to light or heat. In the course of Rumford's experiments on heat he established for the first time the fact of the unlimited productive heat from a limited quantity of matter by the expenditure of mechanical power in friction; a fact subversive of the long prevalent hypothesis of a "subtle fluid" as the cause of heat. He took an active part in the foundation of the Royal Institution. He contributed many papers to the *Philosophical Transactions*, published a series of "Essays, Experimental, Political, Economical, and Philosophical," which extend to four volumes, and projected a great work "On the Nature and Effects of Order." After the death of his American wife he married Madame Lavoisier, the widow of the celebrated chemist, but was subsequently putted from her. He passed his last days in singular retirement at Anteuil, and died on 21st August, 1814.

RUMINANTS (*Ruminantia*) is a section of the order UNGULATA, or hoofed mammals, and suborder Artiodactyla. The ruminants are distinguished by the crescentic crowns of their molar teeth from the pigs (Suidæ) and hippopotamus (Hippopotamidae), under the name Schenodontia. They are divided by Flower into three subsections, the camels (Tylopoda), the chevrotains (Tragulina), and the true ruminants (Pecora). It is with the latter, comprising the deer, oxen, and antelopes, that the present article mainly deals. In these incisor teeth are absent in the upper jaw, the vacant space being occupied by a callous pad; and there are three on each side in the lower jaw. Two canine teeth are closely approximated to these lower incisors, resembling them greatly in size and appearance; in the upper jaw canines are usually absent. The molar series is separated by a considerable space; there are three premolars and three molars on each side in each jaw.

The four feet are terminated by two toes and two hoofs, which oppose to each other a flattened surface, so that they have the appearance of a single hoof which has been split. Behind the hoof there are usually two small processes or spurs, the vestiges of the outer toes. The two bones of the metacarpus and the metatarsus are united into a single one, the cannon bone. The head is usually armed with solid bony antlers (deer), or with hollow horns (oxen, antelopes). In the deer family antlers are very rarely wanting in the male sex, but in the reindeer alone are they common to both sexes. In the hollow horned ruminants these appendages are always present in the male sex, and very generally in the female also. The arteries to the head (carotids) and to the fore limbs (subclavians) arise from a common innominate artery. The placenta is non-deciduate and cotyledonary.

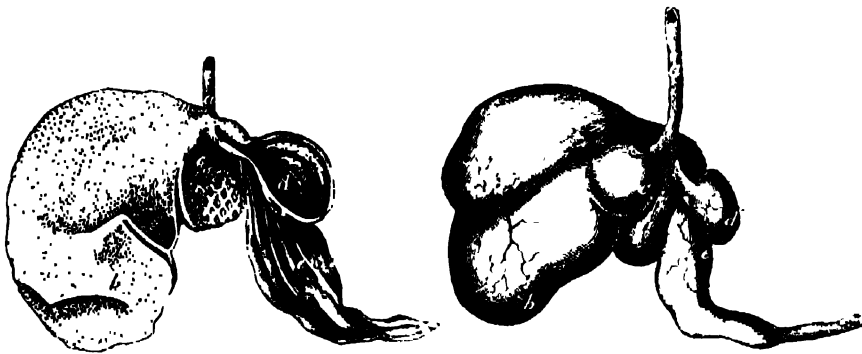
The special peculiarity of the ruminants lies in the complex nature of the stomach, which has four complete

cavities, three of which are modified dilations of the œsophagus, *a*, the fourth being the true stomach. By means of this complex stomach these animals possess the power of chewing the cud, that is, of masticating a second time their food.

The first division or panche, *b* (*rumen*) is much the largest in the adult animal, but not so in the recently born calf or lamb. It is divided outwardly into two bag-like appendages at its extremity, and it is slightly separated into four parts on the inside. The internal coat of this stomach is beset with innumerable flattened papillæ. Here are received the masses of herbage rudely broken up by the first mastication, and here it is (though they sometimes, but seldom, occur in the second) that the morbid concretions of a globular or elongated, but rounded, figure are generally found. These concretions are composed of three sorts of substances—of hairs, of the fibrous parts of plants, or of stony matter. The first of these are formed, particularly in the cow, by the animal's own hair, or that of another cow or ox licked off and gradually accumulated in the stomach. Sometimes these are hairy externally, but

generally they are covered with a dark polished coat. Those found in the chanon consist of vegetable macerated fibres. The stony concretions have received the name of *bezoar stones*. See *BEZOARS*.

The herbage in the state above noticed is transmitted into the second division, the honeycomb bag, bonnet, or king's hood, *c* (*reticulum*), the wall of which is furnished with laminae somewhat resembling the cells of the comb, which is small and globular, may be considered an appendage of the first stomach or panche, but is distinguished from it by the elegantly arranged polygonal acute angled cells, forming superficial cavities on its internal coat. Here the herbage is arrested, imbedded and compressed into small masses or balls, which are then returned successively into the mouth for remastication. During this operation the animals remain in a state of repose until all the herbage swallowed has a second time undergone the action of the molar teeth. The aliment thus remasticated is transmitted into the third or smallest stomach, the maw, *d* (*omasus*), *psalterium*. This stomach is distinguished from the first two both by



Stomach of the Sheep.

its form, which has been fancied to resemble a hedgehog rolled up, and its internal structure, the longitudinal laminae of its walls resembling in some degree the leaves of a book. These numerous and broad duplicatures of its internal coat lie lengthwise, and vary in breadth in regular alternate order, amounting to about forty in the sheep and about 100 in the cow.

From the third stomach the food is transmitted into the fourth, the true or rennet, *e* (*abomasus*), which is next in size to the first stomach or panche, of an elongated pyriform shape, and with an internal villous coat similar to that of the human stomach, with large longitudinal wrinkles. This last is the true organ of digestion, homologous with the simple stomach of ordinary animals.

The first three stomachs are connected with each other, and with a groove like continuation of the œsophagus, in a very remarkable way. The latter tube enters just where the panche and the second and third stomachs approach each other; it is then continued with the groove, which ends in the third stomach. This groove is therefore open to the first two stomachs, which lie to its right and left. But the thick prominent lips which form the margin of the groove admit of being drawn together so as to form a complete canal, which then constitutes a direct continuation of the œsophagus into the third stomach. The functions of this very singular part will vary according as we consider it in the state of a groove or of a closed canal. In the first case the grass, &c., is passed, after a very slight degree of mastication, into the panche as into a reservoir. Thence it goes in small portions into the second stomach, from which, after a further maceration, it is propelled, by a kind of antiperistaltic motion, into the œsophagus, and thus returns into the mouth. It is here ruminated and again

swallowed, when the groove is shut, and the morbid food after this second mastication, is thereby conducted directly into the third stomach. During the shut time which probably stays in this situation, between the folds of the internal coat, it is still further prepared for digestion, which process is completed in the fourth or true digestive stomach. It is further stated that the shutting of the groove when the food is again swallowed after rumination suppresses a power of voluntary motion in the stomach; indeed, it is added, the influence of the will in the whole affair of rumination is incontestable.

Whilst the ruminants remain at the text and live upon nothing but milk, the fourth stomach is the largest of all. The first stomach or panche only develops itself into its enormous volume in proportion as it receives supplies of herbage.

The intestinal canal of these animals is very long, but little enlarged or scculated in the great intestines. The cæcum is moderately long and smooth. The true ruminants consist of the DEER (*Cervidae*), GIRAULT (*Cervicapridæ*), OXEN (*Bovidae*), and the SHEEP and GOATS (*Ovidæ*).

RUMONSCH LANGUAGE. See ROMANCE LANGUAGES.

RUMP PARLIAMENT, the name popularly given to the remnant of the famous Long Parliament of 1649, after Pride's Purge, on 6th December, 1648. For the account of its government to the time of its dissolution by Cromwell, 19th April, 1653, see COMMONWEALTH, and for the part it took in the Restoration, 1659-60, see CONVENTION PARLIAMENT.

RUNCORN, a flourishing market-town and river port of England, in the county of Cheshire, on the left bank of

the Mersey, 12 miles S.E. of Liverpool, and 190 miles by the North-western Railway from London. It is situated at the point where the Duke of Bridgewater's and the Grand Trunk canals communicate with the Mersey, and in consequence of this favourable position has an extensive trade. In 1876 the navigation was further improved by a canal connecting Runcom with Weston Point. In addition to its commerce the town possesses iron-foundries, tanneries, soap and chemical works, and shipbuilding yards, and in the neighbourhood are extensive collieries and quarries of slate and freestone—the latter being exported in very large quantities. There are commodious docks and extensive bonding warehouses. The Bridgewater Dock is 600 feet long and 136 wide, with gates 50 feet wide; there is also a large tidal basin and canal dock. The town has several good churches and chapels for all denominations. There is a town-hall, a market-hall, and custom house. A Gothic public hall, seating 800 persons, was erected in 1867. There is also a theatre, seating 1200 persons, a literary institute, baths, &c. The population in 1881 was 15,133. Near Runcom is a magnificent railway viaduct over the Mersey—one of the finest engineering works in England—which was opened in 1869. It is about a mile and a half in length, including approaches, which latter are built of brick. The main portion, however, is of a wrought-iron lattice-girder bridge over the river, in which there are three openings, each 305 feet wide. There are 75 feet of headway for navigation at high-water spring tides. The structure altogether presents a very grand and imposing appearance.

RUNEBERG, JOHAN LUDVIG, the greatest lyric poet of Sweden, was born at Jacobstad in Finland, 5th February, 1804, and was brought up at Uleaborg, on the Gulf of Bothnia. In his eighteenth year he became a student at the University of Åbo, and when the university seat was changed to Helsingfors continued to prosecute his studies there, graduating in 1827, and being appointed Professor of Literature in 1830. In 1830 he published his first volume of "Dikter," and a collection of "Serviska folksånger" following these up with the poem entitled "Grafven i Perlebo" in 1831. The following year he became editor of a newspaper, the *Helsingfors Morgonblad*, to which he contributed some valuable prose essays, publishing also a second volume of "Dikter" in 1833, a comedy entitled "En älskan i en landsby" in 1834, and a love-lyric, "Hanna," in 1835. In 1837 he was appointed to the Latin "Leete ship" in the gymnasium at Borgå, and the stipend attached to this post, together with a pension granted him by the Russian government, enabled him to devote his chief attention to the cultivation of his poetic gifts. The results of his labours were shown in the publication of the romance "Nilsesbjörn" and the lyric "Juleguden" in 1841, a third volume of "Dikter" in 1843, the heroic poem "Kung Ljudar" in 1844, and the first part of a series of ballads on the last Finland war, entitled "Fänrik Ståls Sägner" (Stories of Lützen Stalk), which excited universal admiration. From 1847 to 1850 he was rector of the college at Borgå, and when, in 1851, he paid his first visit to Sweden he was everywhere enthusiastically welcomed, and was made a member of the Swedish Academy. From 1853 to 1857 he was engaged in bringing out a Swedish psalter for Finland, and he subsequently issued a second portion of the "Fänrik Ståls Sägner" in 1860, a comedy "Kung Ljudar" in 1863, and a tragedy modelled upon Sophocles, "Kung Ljudar på Salamis," in 1863. He died after a long illness, 6th May, 1877, at Helsingfors, Borgholm, although borrowing alike from the classic and romantic schools, was undoubtedly entitled to the appella-

tion of an original poet, and in Scandinavia he was beyond question the most popular poet of his time. See his "Lyrical Songs, Idylls, and Epigrams, done into English," by Eirik Magnusson, M.A., and E. H. Palmer, M.A. (London, 1878).

RUNES or **RUNIC LETTERS** (*run*, a mystery) is the name given to an ancient alphabet peculiar to the Teutonic nations, especially the Scandinavians and Germans. The Norse Runes, which are considered the original system, and a table of which is appended, consisted only of sixteen letters, most of which bear some similarity to the Greek and Roman characters. The earliest Runic characters are on stones, which were either sepulchral monuments or landmarks. Such stones are found in Norway, Sweden, Denmark, Northern Germany, and in some parts of France and Spain; in short, in almost all countries where nations of the Teutonic race took up their abodes during the fourth and fifth centuries of the Christian era. But at present very great mistakes are often made about Runes, as is shown by the famous publication of the Runes on the Saxon font of St. Chad's Church at Wilne, in the *British Archaeological Journal* of 1879, which, after having been variously translated by different antiquaries, proved to be the legs of human figures, of which the bodies had been lost, the stone bearing them being reversed in position. These errors are due to the fact that there are many alphabets of Runes, and also that the mode of reading varies from right to left capriciously, together with other perplexing variations. Christian teachers discouraged their use, as so much of the superstition of the ancient faiths was preserved by their means, but they lasted in England till 950, in Sweden till 1000, and in Spain till 1115. The three great alphabets are the English, the German, and the Norse, the latter being the oldest. Somewhat extensive Runic inscriptions of one variety of the Norse system exist in a curious subterranean chamber under

a	†
b	β
c	γ
d	δ
e	ϕ
f	ϕ
g	γ
h	h
i	ι
k	κ
l	λ
m	μ
n	ν
o	ο
p	π
r	ρ
s	σ
t	τ

Norse Runic Alphabet.



Norse Runes, interior of Maeshowe, on the Mainland of Orkney.

a mound or barrow at Maeshowe, on the mainland of Orkney. Scholars are not yet agreed about their interpretation. An illustration of one of the Maeshowe slabs is given above.

RUNJEET SINGH, Maharajah of the Punjab, and founder of the Sikh power in India, was born at Gugaranwalla on the 2nd of November, 1780. His father was a distinguished commander of one of the twelve "missouls," or military associations of Sikh chiefs, who in a wild way governed the Punjab and the country eastward as far as the Jumna. Runjeet's father died when he was twelve years old, and he was left to the care of his mother, who

to retain her power did all she could to corrupt him. At seventeen he was suspected of having poisoned his profligate and unpopular mother. He assumed the reins of power, and began his long and successful career of aggression and aggrandizement, which was favoured by the weakness and quarrels of his neighbours. After the evacuation of the Punjab by Zinaun Shah, the investiture of the province of Lahore was bestowed on Runjeet, who proceeded to organize the Sikhs into a united power. As he extended his conquests, he would have come into collision with the British had not his sagacity taught him to avoid this danger. In 1809 he signed a treaty with them, and though mutual distrust always existed, both parties carefully avoided interference with each other, Runjeet directing the course of his ambition to the north and west only of the Sutlej River. From the English he learned the value of European discipline, which he introduced into his army. In 1819 he became ruler of Cashmere. The secure consolidation of his rule was partly due to the exertions of four officers of the Napoleonic school whom he took into his service, and who made his army a really formidable force. He was to have aided the English in the war with Afghanistan, but before his sincerity could be tested he died, on the 27th June, 1839. Runjeet Singh was the Mehemet Ali of the Punjab—sagacious, energetic, unscrupulous. He was totally uneducated, yet the indefatigable energy of his administration, and his clemency and moderation, are without a parallel in the East.

RUNNYMEDE, a patch of meadow-land, green and level, in the county of Surrey, on the right bank of the Thames, opposite Magna Carta Island, and in the vicinity of Staines, 20 miles W.S.W. from London. Its name is probably derived from the Anglo-Saxon *rhynca*, or water-courses. Here the Great Charter was signed by King John, 19th June, 1215.

RUPEE, the unit of value in India. The word is the Sanskrit *rupya*, meaning a disc bearing the figure of a man. The coin was first struck, probably with this sort of device, whence its popular name, by Shir Shah, and was adopted by the famous Sultan Akbar.

The present "company's rupee" or government rupee is a silver coin dating from 1835, .9166 fine, weighing 1 tola, that is, 11.664 grammes (180 grains Troy). It contains 16 annas, or 192 pie; an anna = 12 pie. In Ceylon the rupee is the same, but it is divided into 100 cents. The price of silver has varied so greatly in recent years that the exchange value of the rupee has fluctuated in a corresponding manner, to the great distress of officials and merchants in India who have dealings with England. Not very long ago silver was over 5s. an ounce, and it has not unfrequently since then stood at under 4s., a fluctuation of 20 per cent. If fine gold be taken as equal to fifteen and a half times its weight in fine silver, the rupee is worth 1s. 10½d. English; and this was formerly a very fair average, but from 1876 to 1886 it varied between 1s. 5d. and 1s. 8d. For a short time in 1886 it was only 1s. 4½d.

Other famous (native) rupees are the following:—The Arcot rupee of Madras, which was the type of the company's rupee both as to weight and fineness. The Furrukabad rupee was a trifle less heavy than the Arcot. The Sicea rupee (Lower Bengal), of like fineness, was much heavier, weighing 191.9 grains Troy. Old Sicea rupees made light by wear were called Senat rupees, and taken at 5 per cent. deterioration. A lac or lakh of rupees is R. 100,000, and a crore of rupees is R. 10,000,000. This necessitates a peculiar notation. One crore 25 lacs 125 rupees would be written R. 1,25,00,125. Rupee paper is the name given to certain internal Indian loans, the interest of which is payable in rupees. Rupee paper is often called enfaced paper, because of a curious coloured bordering it usually bears on its face. There are various classes, yielding nominally 4, 4½, 5, and 5½ per cent. respectively.

RUPERT, PRINCE (the nephew and general of Charles I.), was born 18th December, 1619. His mother, Elizabeth, daughter of James I., married Frederick V., Elector Palatine, who was banished and deprived of his estates in consequence of his attempt to seat himself upon the throne of Bohemia. Rupert, an exile from his youth, received little education. He had a taste for military pursuits, and offered his services to Charles I., who put him in command of a regiment of cavalry. He took Cirencester, Hereford, and Lichfield, and was engaged in the battles of Worcester, Edgehill, and Chalgrove Field, but he was remarkable rather for his rash courage and impetuosity than for prudence or military knowledge. He captured Bristol, dispersed the parliamentary army at Newark, and was afterwards successful in the north, but at Marston Moor his indiscretion ruined the king's hopes; his want of concert with the Marquis of Newcastle and the hasty withdrawal of his troops from the field of battle are gravely censured by Lord Clarendon. The king's confidence in him, however, did not diminish; on the contrary, Rupert was soon after appointed general of all the royal forces. After the battle of Naseby, Rupert left the king at Hereford, and went hastily to Bristol that he might put that city in condition to resist an attack. The reverse the royal cause had sustained rendered his hold on Bristol a point of the most vital consequence. Rupert wrote so confidently of his operations that the king marched to Chepstow with the intention of joining him. He was, however, dissuaded; and after a short defence Rupert surrendered the city to the Parliamentary army. For this pusillanimity the king deprived him of his command. In 1648, however, he obtained the command of that portion of the fleet which continued loyal; and immediately anchored in the harbour of Kinsale in order to assist the Royalists in Ireland. Here Blake, with the Parliamentary squadron, blockaded him until (October, 1649) he forced his way out, with the loss of two or three ships, and steered for Lisbon. He sailed to Carthage, and thence to Malaga, where he captured and sank some English merchantmen. Informed of this transaction, Blake, who had followed him from the coast of Ireland, attacked Rupert's squadron and burnt and destroyed all but four or five ships, with which the prince escaped to the West Indies, where he captured some English and Spanish merchantmen. Prince Maurice, who accompanied his brother, was cast away, and Rupert contrived, with two or three ships, to return to France, where he sold them on behalf of Charles II. to the French government.

On the restoration of Charles II. Rupert left France and returned to England, where he was made a privy councillor and received other honours. By this time the impetuosity of his youth had diminished, and when the Dutch War broke out the appointment of Rupert to serve under the Duke of York was looked on without dissatisfaction. During the expedition he acquitted himself with credit, which was in no way diminished when, in the following year, he commanded the British fleet in conjunction with Monk, duke of Albemarle. In 1673 he was again nominated to the command of the fleet, but he found its vessels so ill equipped and weakly manned that he returned home. He was governor of Windsor Castle, and spent there a great portion of his time, occupied for the most part with mechanical and chemical experiments, with painting and engraving. In the art of mezzotint he introduced some important improvements; and the useful ally called pinchebeck is attributed to him. He also probably discovered the curious philosophical toys called PRINCE RUPERT'S DROPS. He died at his house in Spring Gardens, London, 29th November, 1682.

RUPERT'S LAND, the name formerly given to the region extending from the ROCKY MOUNTAINS on the W., to HUDSON BAY on the E., on the N. to the Methy Portage,

and on the S. to the boundary of the United States. It is first mentioned in a charter given by King Charles II. to a company of adventurers trading to Hudson Bay, and was named after Prince Rupert. The NORTH-WEST TERRITORY and MANITOBA now comprise what was formerly known as Rupert's Land, and under those headings it has already been described.

RURAL DEAN, in the Church of England, a beneficed clergyman appointed in a diocese to the supervision

He has to see to the conduct of its churches, church furniture, schools, globe houses, and all things pertaining to the due celebration of public worship; and to report, when necessary, to his bishop.

RU RIK, the ruler of the Russian Empire. See *RUSSIA'S CHIEF HISTORY*.

RUSCUS is a genus of plants belonging to the order Liliaceæ. One of the species, Butcher's Broom (*Ruscus aculeatus*), is remarkable as being the only representative of the class Monocotyledons which becomes shrubby in this country. It is a native of the south and west of England, and is often planted in simsbrooms. The flowers are borne singly on what appear to be leaves, but in reality are only bracts. These leaf-like bracts are expanded, green and at physiologically leaves. Their uppoints at the top extended the plant capable of being utilized as brooms, and the common name is derived from their employment in this way by butchers to clean their blocks. The young roots are often like asparagus, to which the genus *Ruscus* is closely related. The male and female flowers are borne on distinct plants; the small greenish-white petals of each flower being composed of six segments. In the male flower there are three to six stamens situated at the base to form a strobilus. Insects are attracted by the honey, and becoming dusted with the pollen carry it to the female plants, and unconsciously fertilize them by thus sowing the honey. The fruit is a small berry, about the size of a small wild cherry. There are two seeds in each of the three cells of the fruit. A species (*Ruscus androgynous*), which is a native of the Canary Islands, has the flowers along the edges of the leaf-like bracts.

RUSH, the common name of the species of *Juncus*, a genus of plants belonging to the order Juncaceæ. The species are numerous, and are found mostly in moist boggy

lowland, and in the tropics. The *Juncus effusus* (the soft rush) and the *Juncus conglomeratus* (the common rush) are used in many parts of the country for thatching, and also for the bottoms, and for constructing small boats. The wicks also of the candles known as rush candles used in former times, were made from the pith, and are properly speaking the soft inner portion of the stem of these two species, which is chiefly composed of cellulose. The flowers in the genus have six leaved petals, a perfect stamen, three stamens, and a three-lobed ovary with numerous seeds attached along the middle of the three lobes.

The Dutch or Sea-rush, a species of *Lythrum* (*Lythrum salicaria*), was largely imported from Holland and used for painting, wood, brass, &c. The Bog Rush is a *Juncus* to the Club Rush to the *Lythrum* of Sirpas. Flowering Rush is *Butomus umbellatus*. See *BUTOMUS*.

RUSH WORTH, JOHN, a very useful historical compiler and collector, and one of the main authorities for the great Civil War of Charles I. and the Long Parliament, was born in Northumberland of good family about 1667. Studying for a short time at Oxford, he became a barrister at Lincoln's Inn, but from an early period he seems to have neglected his profession to collect papers and documents, not only of contemporary events, and to be an eye-witness

and ear-witness of what was most remarkable in the stirring time on which he had fallen. He took notes indefatigably of parliamentary and judicial proceedings, not missing a day of Lord Strafford's trial, and roamed about the country to see such sights as the camp at Berwick, the battle of Newburn, and the council of York. On the meeting of the Long Parliament he was appointed assistant to its clerk, Henry Elsynge, and in 1645 secretary to Fairfax. He accompanied Cromwell as secretary in his Scotch expedition of 1650, and represented Berwick in the Parliaments of 1658 and 1660, as well as those of 1678 and 1689. The first part of his "Historical Collections" was published in 1659. But his last years were spent in misery, which he endeavoured to alleviate by drinking. In 1684 he was arrested for debt and imprisoned in the King's Bench, where he died in 1690. The publication of his "Historical Collections of private passages of State, weighty matters in Law, and remarkable proceedings in Parliament," was not completed until 1701.

RUSKIN, JOHN, an eminent English author, was born in Hunter Street, London, on the 8th February, 1819. "I am more thankful through every year of added life," he once wrote, "that I was born in London." His father, "an entirely honest merchant," as his son describes him, made a fortune in the wine trade. "My mother," he says, "had it deeply in her heart to make an evangelical clergyman of me;" and she forced him by steady daily toil to learn long chapters of the Bible by heart, as well as to read through every syllable of it aloud, "and names and all," from Genesis to the Apocalypse, at least once a year. To this discipline, "patient, accurate, and resolute," Ruskin attributes his general power of taking pains, the best part of his taste for literature, and the possession of a style free from the artificiality of Gibbon or of Johnson.

When about twelve years of age he was provided with a drawing-master, from whom he learned perspective, "but no impulse, nor even indulgence, to the extraordinary gift I had for drawing delicately with the pen point." The possession at this time of Rogers' "Italy," with Turner's illustrations, determined, as he tells us, the main turn of his life. Constant travel and private tutorships, with gradually developing taste for art and mineralogy, filled the years of early boyhood, during which it was Byron who, "though he could not," Ruskin says in "Pictura," "teach me to love mountain or sea more than I did in childhood, first animated them for me with the sense of real human nobleness and grief." Of Johnson he adds, "He secured me by his adamant common sense, for ever, from being caught in the cobwebs of German metaphysics, or sloughed in the English drainage of them."

His first literary efforts were a short story and various poems, published in "Friendship's Offering," when he was but fifteen years of age. At sixteen he may be said to have commenced the business of his life in earnest by writing an article for London's "Magazine of Natural History," entitled "An Inquiry into the Causes of the Colour of the Waters of the Rhine" (1834). In 1837 he was entered as a gentleman commoner at Christ Church College, Oxford, gaining, two years later, the Newdigate prize for English poetry, his subject being "Salsette and Elephantia."

In 1843 he produced the first volume of "Modern Painters: their Superiority in the Art of Landscape Painting to all the Ancient Masters, by a Graduate of Oxford." The work originated, he says, "in indignation at the shallow and false criticism of the periodicals of the day on the work of the great living artist to whom it principally refers." This artist was J. M. W. TURNER, of whom ten years later Ruskin wrote:—

"I tell you the truth, which I have given fifteen years of my life to ascertain, that this man, this Turner, of whom you have known so little while he was living among you,

will one day take his place beside Shakspeare and Verulam, a third star in that central constellation round which, in the astronomy of intellect, all other stars make their circuit. By Shakspeare humanity was unsealed to you; by Verulam the *principles* of nature, and by Turner her *aspect*. All these were sent to unlock one of the gates of light, and to unlock it for the first time. But of all the three, though not the greatest, Turner was the most unprecedented in his work. Bacon did what Aristotle had attempted; Shakspeare did perfectly what Æschylus did partially; but none before Turner had lifted the veil from the face of nature; the majesty of the hills and forests had received no interpretation, and the clouds passed unrecorded from the face of the heaven which they adorned and of the earth to which they ministered."

Flinging himself ardently into this work of vindication and of eulogy the book soon extended beyond the mere essay first intended, was enlarged (1816), and a second volume added, treating "Of the Imaginative and Theoretic Faculties." Three additional volumes, illustrated by the author, were produced much later—the concluding one in 1860. Ruskin subsequently revised this work, making important alterations (five vols. *Svo*, London, 1860-67). The book became so scarce that thirty-five guineas were frequently paid for it, Ruskin declaring that he would never republish it as a whole, and that he had destroyed the plates; but a selection called *Readings* was issued in 1875 under the title of "Fiondes Agrestis" (The Foliage of the Trees), and still later (1884) some "Reprints" appeared—"Celtic Enniamant: Studies of Cloud Form;" and "In Montibus Sanctis: Studies of Mountain Form." Of these reprints only three parts had been issued when Ruskin (influenced probably by the frequent appearance in this country of a badly-printed American edition) finally decided to republish his greatest work in its entirety. The book has been described as a philosophical treatise on landscape painting, but it is this and much more. A sympathy with nature as keen as Wordsworth's is added to a descriptive power without parallel in literature. To none but a few of our greatest poets has it been given to describe with so much thought and with so much feeling the grandeur and the loveliness revealed in mountain and in valley, in clouds and in sunshine. "The sun is going out," he fretfully complains in his "Delecta," but to those who know the glorious word-pictures of this great prose poem, it seems to shine with additional radiance. Not only art and science, but literature and life, are here discussed, and criticisms of Homer and Dante may, in their subtlety, be placed side by side with Goethe's criticism of "Hamlet" and Lessing's "Laoköon."

"The Seven Lamps of Architecture" (1849) is a brilliant attempt at reform in domestic and church architecture. The "lamps" represent the characteristics which good architecture should possess. The first is the Lamp of Sacrifice: "What of beauty and what of riches we may possess, let a portion be dedicated to God. It was in this spirit that our cathedrals were built." The second, the Lamp of Truth, is a plea for honesty in architecture, no imitation wood or marble, but solid wood and solid stone. "Exactly as a woman of feeling," he says, "would not wear false jewels, so would a builder of honour disdain false ornaments. The using of them is just a downright and inexcusable lie." The third is the Lamp of Power: "Until that street architecture of ours is bettered, until we give it some size and boldness, until we give our windows recess and our walls thickness, I know not how we can blame our architects for their feebleness in more important work." The fourth is the Lamp of Beauty, and in this chapter he maintains that "all the most lovely forms and thoughts" are directly taken from natural objects. The fifth is the Lamp of Life. "To those who love architecture," he says, "the life and accent of the hand are everything." The sixth is the Lamp of Memory: "All public edifices should be records

of national life, all ordinary dwelling-houses endeared to their owners by sacred and sweet associations. There is infinite sanctity in a good man's house!" The seventh is the Lamp of Obedience, and here he pleads eloquently for the enforcement of an established type of architecture—the Gothic, in his judgment, lending it its most ready to all services, vulgar or noble.

The "Stones of Venice" (1851-53), in three volumes, gives in further detail, with beautiful illustrations, Ruskin's views of the laws of architecture. Of the work a new edition appeared in 1886. In 1851 he began a series of "Examples of the Architecture of Venice," of which but three parts were published. Among his other architectural works are—"Lectures on Architecture and Painting" (1854); "Letters to Sir H. W. Adams, on the Oxford Museum: A Plea for Gothic Architecture" (1860); "II. Study of Architecture in our Schools" (1865), and a pamphlet entitled "The Opening of the Crystal Palace considered in some of its Relations to the Prospects of Art," a treatise in which he complained that Turner's magnificent gift of his pictures to the nation—now well housed in the National Gallery—was being neglected, that the masterpieces of Titoret were actually rotting away in Venice, and beautiful Gothic buildings were everywhere being ruthlessly neglected. The pre-Raphaelite movement of Millais, Rossetti, and Holman Hunt only enlisted the sympathy of Ruskin, and in "Pre-Raphaelitism" (1854) he declared that they had worthily followed the advice given in "Modern Painters" to "go to nature in all singleness of heart, and walk with her laboriously and trustingly, having no other thought but how best to penetrate her meaning; rejecting nothing, selecting nothing, and scorning nothing." In his "Notes on some of the Principal Pictures exhibited at the Royal Academy" (1855-59) he continued the defence of men who now reign supreme in art. [See PRE-RAPHAELITE BROTHERHOOD.] His other art studies include "Giotto and his work in Padua" (1854); "The Huberts of England" (1856); "Notes on the Turner Gallery at Mulberry House" (1857); "The Elements of Drawing" (1857); "A Joy for Ever (and its Place in the Museum): the Substance of Two Lectures on the Political Economy of Art" (1857); "On the Proper Use of Art" (1858); "The Elements of Perspective" (1859); "The Two Paths: Lectures on Art and its Application to Decoration and Manufacture" (1859); "Arata Pentelici, Six Lectures on the Elements of Sculpture" (1870); "The Relation between Michael Angelo and Titoret" (1871); "The Eagle's Nest, Ten Lectures on the Relation of National Science to Art" (1872); "Atalante Florentina, Six Lectures on Wood and Metal Engraving" (1872); "Val d'Arno, Ten Lectures on Art of the Thirteenth Century in Pisa and Florence" (1873); "Monings in Florence" (1875); "St. Mark's Rest" (1877); "The Laws of Ptolemy: A Familiar Treatise on the Elementary Principles and Practice of Drawing and Painting" (1877-78); "The Art of England" (1883), and "The Pleasures of England" (1884). But in Mr. Shepherd's "Bibliography of Ruskin" (1879) there are 226 separate publications enumerated. Ruskin has written interestingly on botany, geology, mineralogy, natural history, and comparative mythology in his "Prescriptions: Studies of Wayside Flowers" (1875); "Dendrology: Studies of the Types of Waves and Life of Stones" (1875-78); "Catalogue of Selected Examples of Native Silver in the British Museum, South Kensington," "Ethics of the Dust, Ten Lectures on Little Housewares on the Elements of Civilisation" (1865); "Love's Memoir, Essays on English Birds" (1864), and the "Queen of the Air, a Study of the Greek Myths of Cloud and Storm" (1869). Then we have from his pen one of the most charming of children's story books, "The King of the Golden River, or The Black Brothers, a Legend of St. Nicholas" (1851).

But, as Goethe declared of himself that posterity would

Honour him, not for his poetry, but for his discoveries in science, so Ruskin perhaps more justly insists that it is as an economist that he is most deserving of remembrance. The four essays on the first principles of political economy, entitled "Unto this Last" (1862), he declares to be "the truest, rightest-worded, and most serviceable things" he has ever written. These essays were originally published by Thackeray in the *Cornhill Magazine*, but the remonstrances of its readers brought the series to a speedy end. The principles of state socialism there initiated have since entered the field in direct contest with the established order of things. The so-called laws of political economy have little influence on an age bent on free education, free libraries, the housing of the poor, state-aided emigration, and the municipalization of the land. Carlyle with prophetic vision foretold these things in "Past and Present." Ruskin has done much to further the fulfilment of the prophecies of one whom he reverently calls his "dear master." He would abolish usury, and therefore withdrew all his own money from speculative concerns to invest it in consols; he would have every child in the country taught a trade at the cost of government; he would have manufactories and workshops entirely under government regulation for the production and sale of every necessary of life, and for the exercise of every useful art; he would permit competition with government manufactories and shops, but all who desired work could be sure of it at the state establishments; finally, he would provide comfort and homes for the old and destitute, as "it ought to be quite as natural and straightforward a matter for a

man to take his pension from his parish, because he has served well of his country, as for a man in higher rank to take his pension from his country because he has served well of his country." Ruskin has amplified his economic notions in "Munera Pulveris" (1872), "Time and Tide by Wear and Tyne" (1867), and "Fors Clavigera" (eight vols., 1871-79). "Time and Tide" is a collection of letters on the laws of work to the late Thomas Dixon, a working clockmaker of Sunderland. They were originally published in the *Manchester Examiner*. "Fors Clavigera" is a series of ninety-six letters to workmen, which were issued in monthly parts, and which were rendered additionally interesting by the quantity of authoritatively ascertained facts so freely interspersed in them. The title is derived, as Ruskin has explained, from the Latin *fers*, the best part of three good English words—*free*, *fortunate*, and *fortune*. The root of the adjective *clavigera* being either *clava*, a club, *axis*, a key, or *clavis*, a nail, and *gero*, to carry. For the Christian therefore emblem of the strength of Hercules or of David, the Key-bearer, the stronger Ulysses or of Patience; and the Nail-bearer, the strength of Lycurgus or of Law. To carry out his principles practically, Ruskin established a Guild of St. George in the Marylebone Road, where he sold the best tea and wine at a fair price, and received the St. George's Guild with a view of showing "the rational organization of country life independent of that of cities; for in other words, the restoration of the peasantry to the soil of England." One of the conditions of membership was that every member should give one-tenth of his property to the guild for carrying out its work. Ruskin laid the way for property being then estimated at £70,000. He has told us in "Fors" that out of the £157,609 left him by his parents he has spent £153,000. Much of this must have gone to the Walsley Museum at Sheffield, which is the property of the Guild; £5000, however, were devoted to the Taylor Galleries at Oxford. In the Master's report of the Guild (1886) Ruskin says: "Finding the original condition of companionship—subscription of the tenth of income—entirely prohibitory of all help from rich people, I accept for members now any one who will consent to our laws and subscribe £5 a year and upwards."

In 1867 Ruskin was appointed Redo Lecturer at Cambridge, and received from the university the degree of LL.D. In 1869 he was elected Slade Professor of Fine Arts in the University of Oxford. This office he resigned, but resumed again during the years 1883-84. In 1882 J. M. Whistler brought an action for libel against Ruskin for having accused him of "thumping a paint-pot in the face of the public and calling it a picture," and the jury returned a verdict for one farthing damages. Ruskin's admirers subscribed £1000 to give him a Turner painting, and £100 more to pay the law costs of his defence in the libel case.

Ruskin's other works include—"Notes on the Construction of Sheep Folds" (1851), which, although dealing with the reform of church discipline and government, is said to have had a considerable sale among the moorland farmers, whose reception of it was not favourable; "Sesame and Lilies" (1865); "Crown of Wild Olive" (1866), four essays on Work, Traffic, War, and the Future of England; "Arrows of the Chase," a collection of scattered letters; "On the Old Road," a volume of miscellaneous pamphlets, articles, and essays; "Letter to Young Girls" (1876); "Our Fathers have Told us," sketches of the history of Christendom for boys and girls who have been held at its font—of this work one volume has appeared in parts (1881-85) with the sub-title "The Bible of Amiens;" "Præterita, Outlines of Scenes and Thoughts perhaps worthy of Memory in my Past Life," an autobiography in three volumes, each covering twenty years (1886-87); "Delecta, consisting of Correspondence, Diary References, and other Documents illustrating Præterita" (1886-87). Of these books by far the most important is undoubtedly "Sesame and Lilies," which was written, he says, "while my energies were still unbroken and my temper unfretted, and if read in connection with 'Unto this Last,' contains the chief truths I have endeavoured through all my past life to display, and which, under the warnings I have received to prepare for its close, I am chiefly thankful to have learnt and taught." It treats of "the majesty of the influence of good books and of good women, if we know how to read them and how to honour." How to read books he shows by analysing the well-known passage from Milton's "Lycidas" on "The Pilot of the Galilean Lake," and explaining the deep meaning of every word. "You might read," he says, "all the books in the British Museum (if you could live long enough), and remain utterly illiterate, uneducated person; but if you read ten pages of a good book, letter by letter—that is to say, with real accuracy—you are for evermore in some measure an educated person." How to honour women, how women may become worthy of honour, he shows by taking us to Shakespeare and to Scott, whose Portias and Rosalinds, Catherine Seytons and Diana Vernons are ever ready at critical moments to be a help and a guidance to men; and finally he appeals to the great Florentine, and shows us Beatrice leading Dante through the stony spheres of heaven up to the very throne of light and of truth. But the book is full of healthy and helpful passages, and is, like so much that its author has written, a moral inspiration for all who read it. "I am a great man," Ruskin once said, with a consciousness of genius which recalls Horace and Milton, Shakespeare and Goethe. Posterity, we believe, will endorse the self-criticism, and will not willingly let his works or his memory die.

RUSSELL, JOHN, EARL, the most distinguished member of a noble Whig family which has played an important part in English history, was third son of the sixth Duke of Bedford, and was born the 18th August, 1792. He was educated at Sunbury, Westminster, and at the University of Edinburgh. At seventeen years of age he was a student in the classes of Dr. Thomas Brown and Dugald Stewart, and from 1808 to 1813 he travelled much, visiting in his journeys Lord Wellington at Torres Vedras

and Napoleon at Elba. At the time of his visit to Elba Lord John Russell was already in Parliament, having been elected in July, 1813, a month before he was of age, for the family borough of Tavistock. He went into the House of Commons with all the prestige of a great name and great connections, but his party was in the minority and his prospects were but poor. His maiden speech was delivered on the 14th July, 1814. In 1815 he spoke on Napoleon's return from Elba, vindicated the right of a nation to choose its own government, and was one of the small minority of seventy-three who voted against declaring war upon Napoleon. Lord John Russell soon became remarkable for the vigour and boldness with which he advocated measures of national economy and retrenchment, and for his liberal views as regards the extension of civil and religious freedom. It was not long before he identified himself with the important question with which the first and greatest successes of his life were connected—viz. that of parliamentary reform. While the country was in the midst of the most intense agitation and excitement Lord John Russell, on the 14th December, 1819, made his first speech on this subject. The efforts of the young reformer met with little sympathy in the House, but in the country the advent of another champion of the cause was hailed with delight. In 1821 he attained his first success by the disfranchisement of Grampound and the transfer of its members to Yorkshire—the only gleam of good fortune the reform cause obtained during the reign of George IV. In 1823 Lord John Russell spoke strongly in favour of a motion by Lord Francis Egerton, sanctioning the endowment of the Roman Catholic Church in Ireland; and to this "concurrent endowment" view of settling the Catholic question he adhered, and advocated it in 1868, on the eve of the disestablishment of the Irish Church. There was even less chance of its succeeding in 1823, however, than in 1868. The country was quite as much opposed to Catholic emancipation, for supporting which Lord John Russell lost his seat for Huntingdonshire in 1826, and was returned for Bandon-Briggs in Ireland. On the 26th February, 1828, he moved for a committee to consider the Test and Corporation Acts, and, to his own great surprise, carried it by forty-four in a House of 430 members. Peel got the words "on the true faith of a Christian" inserted to mollify the bishops, and thus left a Jewish controversy to be settled a generation later.

When the new Parliament, which had been elected on the demise of the king, met in November, 1830, the Duke of Wellington made his celebrated declaration against reform, and the challenge was speedily answered by the defeat of the government in a division upon the civil list, when they resigned, and a Whig ministry under Lord Grey was formed, with Lord John Russell as paymaster of the forces. Comparatively subordinate as was this position, he was so clearly marked out as the leader of the reform movement, that the matter was confided to him by Lord Grey. He therefore prepared a measure which, with but slight alteration, was adopted by the ministry. On the 1st March, 1831, Lord John Russell unfolded his scheme to a House of Commons crowded beyond precedent. The bill was so unexpectedly sweeping in its provisions that the idea of carrying it was for the moment regarded as impracticable. It was read a first time, however, on the 14th March, and a little later the second reading passed by a majority of one. The Opposition then rallied for a last effort, and on the 22nd April the bill was thrown out. Parliament was dissolved, and writs were made returnable on the 11th June. On the 24th Lord John Russell again introduced his bill, which was read a second time by a majority of 136, and sent to the Lords by a majority of 109. The Lords threw it out, and the excitement throughout the country rose to the verge of revolution. Lord John introduced the measure again on the 12th December, after which it was

rapidly passed through all its stages, and the Lords' concurrence was requested. It was at first refused, and the bill only passed on the threat of the king to create sufficient peers to carry the measure.

The Reform Bill raised Lord John Russell to the highest pitch of his popularity, established him in the front rank of parliamentary statesmen, and marked out for him a great career. In 1835 the success of his motion for a committee to inquire into the Irish Church establishment led to Peel's resignation, and Lord Melbourne was recalled to office, Russell becoming home secretary and leader of the House of Commons. In August, 1839, disturbances in Canada led him to exchange the home for the colonial secretaryship, which he retained until the resignation of the Melbourne ministry in September, 1841. As leader of the House of Commons he had taken a chief part in the Municipal Corporations Act (1835), the General Registration Act (1836), and other important measures. In 1846, on the defeat of Sir Robert Peel, Lord Russell was summoned to form a ministry. He succeeded, and remained in office until 20th February, 1851, when he resigned, only to return 3rd March, and to remain until February, 1852, when he gave way to Lord Palmerston. In the coalition government of Lord Aberdeen, Lord Russell entered it as secretary for foreign affairs with the leadership of the House of Commons. He withdrew from the ministry just before Roebuck's motion for a Canning committee of inquiry, and was sent immediately afterwards as British representative to the Conference of Vienna, where he was only moderately successful. In 1859 he served as foreign secretary under Lord Palmerston, and in 1861 he was raised to the peerage as Earl Russell. In 1865 he succeeded Palmerston as premier, but resigned the following year on the defeat of his proposed measures of reform, and with this retirement his career as a statesman came to a close. In the later years of his political activity, when the greatness of his early achievements had sunk into the historic past, Lord Russell's popularity was somewhat eclipsed by the more genial humour and tact of Lord Palmerston, and by the more brilliant genius of younger men. The closing years of his life were spent in the lettered ease and domestic retirement which had been dear to him even in the busiest part of his active life. He was the author of a "Life of Lord William Russell," a tragedy entitled "Don Carlos," of an "Essay on the English Constitution," "Essays on the Rise and Progress of the Christian Religion in the West of Europe, from the reign of Liborius to the Council of Trent;" and of numerous minor publications. Lord Russell died at Richmond, on the 28th May, 1878, at the advanced age of eighty-six.

RUSSELL, LORD WILLIAM, was born in September, 1639. He was the son of William Russell, fourth Earl of Bedford, who married Lady Anne Carr, daughter of the Countess of Somerset. He was educated at Cambridge, afterwards resided at Augsburg, spent a considerable time in different parts of the Continent, returned to England at the Restoration, and was elected member for Tavistock. He associated himself with the popular party, which before long gained so great an influence in the country that the king persecuted the Parliament, and when it re-assembled found that it was hopeless to attempt the continuance of the Dutch war. Thus the alliance with France was dissolved, and the troops by which Charles had wished to make himself absolute were dispersed, the Cavalier ministry was broken up, and Buckingham and Shaftesbury were converted into popular leaders. The king's subsequent intrigues with France were further opposed by Russell, the country party recommended war with France, promoted the impeachment of the king's minister and favourite, Lord Danby, and voted the exclusion of the Duke of York from the succession to the throne. Some of the principal Whigs

were accused of having conspired to take the king's life, to raise a rebellion in the country, and to establish the Duke of Monmouth, the king's illegitimate son, upon the throne. This was called the Ryehouse Plot, from the name of a farm near Ware, at which it was said that the conspirators agreed to meet, in order to attack and dispose of the king as he returned from Newmarket races. [See RYEHOUSE PLOT.] Russell, Essex, Sidney, and a number of less important persons, were immediately committed to the Tower. Some were convicted and executed before Russell was brought to the bar. On 13th July, 1683, he took his trial at the Old Bailey for high treason. A full account of the proceedings is given by Earl Russell ("Life of Lord William Russell," p. 180), and in Phillips' "State Trials." An illegal construction was put on the 25th of Edward III., the statute under which he was indicted. The evidence against him was contradictory and insufficient; no one charge in the indictment was proved, but in the nomination of the panel, the sheriffs, who were creatures of the court, had secured his conviction. A packed jury readily accepted the evidence of suborned and perjured witnesses. He was found guilty, sentenced to death, and beheaded in Lincoln's Inn Fields, 21st July. The firm and noble conduct of Lady Russell, the second daughter of the Earl of Southampton, who attended her husband during his trial, to take notes and give him assistance, deserves the highest admiration. She died at Southeyton House, in September, 1723, at the advanced age of eighty-six.

Lord Russell as a politician was cool and energetic, though not conspicuous in any of the public estimation of his day. He was cold and far from being a statesman, as we would judge from his sense, his judgment, and his energy. An Act for annulling his attainder was passed in the first year of William and Mary, in 1689. He was, by a legal and illegal return of prisoners, brought back to his level of challenge to the sad judges for want of food, and by partial and unjust construction of law, wrongfully convicted, attainted, and executed for high treason.

RUSSIA. The Russian Empire, one of the most extensive of ancient or modern times, occupies the whole northern portion of the eastern hemisphere, from Bear-Ing Strait to Norway. The territories are thus continuous from W. to E., between lat. 18° E. and 170° W. They are bounded on the E. by Behring Sea and the Pacific, N. by the Arctic Ocean, W. by Norway, Sweden, the Baltic Sea, and by Prussia, Austria, and Rumania, and on the S. by the Black Sea, the Turkish and Persian territories, Turkistan, Mongolia, and Manchuria. The extreme latitudes are 67° 50' N. on the River Atrek, S.E. of the Caspian, to 177° 30' N. at the extremity of the North-east Cape, Siberia. The entire area of these vast territories is reckoned at 8,644,100 square miles, with a population of 102,270,000.

The nature of the surface and other particulars relating to Siberia, Asia, Russia will be found under SIBERIA. In this section we shall confine ourselves to European Russia, of land, lying between the Caspian and Black Sea on the S. and the Arctic Ocean on the N., and between the Ural Mountains N.E. and the Caucasians S.W. The extreme lat. are 38° 25' and 79° 16' N.; lon. 18° and 66° E. The area, including Poland, Finland, and the Caucasus region, is 2,263,541 square miles, or about half of Europe, with a population in 1886 of about 94,000,000.

Surface.—The whole surface of Russia may with propriety be considered an extensive plain. If the Ural Mountains, which extend along its eastern border, the Caucasus, between the Euxine and Caspian seas, and a mountain tract in the peninsula of the Crimea are excepted, there is not in this immense extent of country an elevation which rises more than 500 feet above its base, or more than 1100 feet above the sea-level. The watershed

which divides the rivers that flow to the Arctic Ocean, the Baltic, the Black Sea, and the Caspian Sea, is not formed, as in Western Europe, by mountains, but by tracts of gently rising ground.

Taking the town of Mojaïsk on the Moskwa as a centre, there are three lines of watershed, extending to the limits of European Russia in three directions. The first extends westward to the banks of the river Bug, about 82° N. lat., 21° E. lon.; its most elevated point is about 700 feet; it forms an almost continuous swamp, in which many affluents of the Vistula, Dnieper, and Niemen take their rise; and it divides the rivers which flow into the Baltic from those which flow into the Black Sea. The second watershed begins near the Moskwa, and extends in a general N.E. direction to the Ural Mountains, which it reaches in 61° N. lat., 59° E. lon.; its most elevated point is 931 feet; it has more forest and less morass than the first; it contains the sources of the Volga and other large rivers, and divides the rivers which flow into the White Sea from those which flow into the Caspian. The third watershed begins near the same point, and extends S.E. to the Ural in 56° N. lon.; it includes more sandy hills than either of the other two. This basin divides the Volga from the rivers which run southward and unite with the Dnieper and the Don.

Besides these lines of watershed, there is in the southern provinces an elevated tract, the base of which is granite, and which traverses it nearly from east to west, but does not form a watershed, being broken through by several large rivers. At its western extremity it is connected with the eastern offsets of the Carpathian Mountains, and at its eastern it fills up the great bend of the river Don, which occurs between 48° and 50° N. lat.

Soil and Climate.—Russia has a much greater variety of soil than any other country of Europe. Some very extensive tracts are hardly more adapted for agriculture than the great African desert, while others may be compared in fertility with those countries without the tropics which are most favoured by nature.

The most valuable portion is included between the Baltic, the Gulf of Finland, and the Volga, on the north and east, the Black Sea on the south, and Austria and Prussia on the west. It has, generally speaking, a soft black mould, called *chernozem*, impregnated with saltpetre, of great depth, mostly on a sandy bottom, easily wrought, very fertile, and rarely requiring manure. In some places it inclines to sand and gravel; in many, from want of drainage, it is peaty and boggy; in Livonia and Lithuania it is clayey, but nowhere does it incline to chalk. The soil of the northern part, between the Arctic Ocean and the Ural, being a table-land, is generally marshy; but in its middle portion, between the rivers Onega and Mezen, and especially along the banks of the northern Dwina, immense forests of fir wood and large tracts of fodder grass occur. Towards the east of this district the woods disappear, and vast marshes, frozen the greater part of the year, cover the country. The tract which commences between the Sea of Azof and the Caspian, and extends to near the shores of the latter, and between the Volga and the Ural, as far as the Emba, is little better than a desert, being level, dry, high, barren, and full of salt lakes.

The fact that the intensity of cold in Europe increases from west to east is illustrated by the climate of Russia. While the mean annual temperature of the western coast of Norway, as far north as North Cape, is always above 32°, the vast extent of Russia in the same latitude has a mean temperature below 32°. We may term this the Arctic Region. Southward of it comes the Cold Region, in which the mean annual temperature varies between 32° and 40°. The southern limit of this portion begins on the shores of the Baltic, on the Gulf of Riga, about 58° N. lat., and extends to the Ural, which it touches at about 51° N. lat. The Neva is generally covered with ice for 160 days in the

year. Both spring and autumn are short, and the transition from cold to heat, and *vice versa*, is rather rapid. In summer the heat for two or three weeks is very great. At Casan the thermometer in winter generally descends to 28° below zero, and in summer it rises to 95° and 96°. At St. Petersburg there are annually, on an average of ten years, ninety-seven bright days, 104 rain, seventy-two snow, and ninety-three unsettled. The Temperate Region extends over the southern provinces, as far north as the line above-mentioned. Its mean annual temperature varies between 40° and 50°, but in the Crimea and in the country between the Dniester and the Danube it rises to 54° and 56°. This region is distinguished by severe though short winters, and by long and very hot summers. The thermometer generally sinks in the western districts to 12° below zero, and in the eastern to 20°. In the middle of May a sudden change takes place. In a few days the heat increases to such a degree as to become oppressive. In June and July it still continues increasing, until the thermometer attains between 90° and 100°. At Astrakhan, in lat. 46° 21', nearly the same as that of Lyons, the Volga is sometimes frozen over so as to bear loaded waggons. The Sea of Azov is generally frozen from November to the beginning of April. The countries which border on the Baltic and on the White Sea have a wet climate, and rain is frequent all the year round; in winter a considerable quantity of snow falls. Notwithstanding the cold the climate of Russia is, on the whole, healthy, for during the winter the air is very pure and bracing, but the average of the duration of life is low. It is true there are some places where certain diseases seem localized, but they are the exceptions which prove the rule. For instance, on the shores of the Arctic Sea scurvy is common; on the marshes along the Vistula and Niemen the *PLICA POLOXICA* prevails; and in the marshy lands near the Black, Azov, and Caspian Seas, ague is always more or less general.

Rivers, Lakes, and Canals.—The principal rivers are noticed in the articles DWINA, VOLGA, DUNA, NIEMEN, DNIEPER, DNIESTER, DON, and URAL. As Russia is a level country, the rivers present a greater line of inland navigation than those of most other countries. The Volga, Niemen, and Dwina have fewest interruptions to continuous navigation; the others are obstructed by shallows, rapids, and falls.

Lakes are very numerous in certain parts of the empire, especially in the north-west and south-east. Almost all those which occur in the salt steppes that surround the northern shore of the Caspian, as well as in those of the Crimea and the Nogay steppe, are salt lakes, and salt might be obtained from all of them. Those from which it is actually procured are Elton, Bogdoin-Dabossu, and Inderskoë. There are few lakes in the interior of Russia, and they are all small; but those of the countries surrounding the Gulf of Finland are very numerous. The largest is the Lake of Peipus or Pskov, which is nearly 90 miles long, in its northern part nearly 30 miles wide, and in some parts 10 fathoms deep. In the country north of the Gulf of Finland there are several systems of lakes, of which the chief are those of Saima and Päijänne. The country which extends between the innermost recess of the Gulf of Finland and that bay of the White Sea which is called the Gulf of Onega, contains the largest lakes in Russia and in all Europe, Ladoga and Onega. The former is nearly 120 miles long, and its greatest width is 70 miles. A few rocky islands occur along its north-western shores, but none in the main body of the lake. The depth in some places is nearly 150 fathoms. The Lake of Onega is more than 120 miles long, with an average width of nearly 40 miles. Along the shores there are numerous rocky islands, but the main body is free from them. The waters of this lake are discharged into that of Ladoga by the Svir River, which is about 120 miles long, and flows through a low

and swampy country overgrown with thick forests. The surplus of the waters collected in the Lake of Ladoga is carried to the Gulf of Finland by the Neva, past St. Petersburg.

Some of the smaller lakes, such as Bieloe Ozero, or White Lake, Kobenskoe, and Ilmen, have afforded great facility for establishing a water-communication by canals in the interior of Russia.

As the hydrographical condition of the country affords many facilities for the formation of such works, all the four seas surrounding the empire are now connected by this means of communication. All the canals which have been undertaken to unite rivers having their rise south of 55° N. lat. have failed on account chiefly of deficiency of water, but those which have their sources further north are found better fitted for this purpose. The three most important constitute a water-communication between the river Volga and the lakes of Onega and Ladoga, and consequently with the Neva and St. Petersburg. The most famous and most frequented of them is the Canal of Vishni Volotsk, only 3 miles long, by which a direct water-communication is opened between St. Petersburg and Astrakhan, a distance of 3200 miles, this great length of navigation being earned on by means of the river Twerza, Lake Mstino, the river Msta, Lake Ilmen, with a few miles of subsidiary canal, and the Volchov. The second line of water-communication is formed by the Tikhvina Canal, which is further to the N.N.E., near 59° 25' N. lat. and 31° 20' E. lon. This line of inland navigation begins in the Volga at the mouth of the river Maloga, and is the means of uniting the former with Lake Ladoga. The canal itself is only 5 miles long, and 36 feet wide at its upper level; but the number of locks amounts to eighty-six. The third line of water-communication traverses the two lakes of Onega and Bieloe Ozero, and extends to St. Petersburg.

As these three systems of inland navigation traverse the lakes of Ladoga and Onega, and barges were originally obliged to pass over them, heavy losses of property were frequently incurred through the gales to which the lakes are subject. To avoid this dangerous navigation, canals have been made along the southern shores of the inland seas. The Lake of Bieloe and its outlet the river Chiksna afford the means of uniting by one system of canals the river Dwina and the city of Archangel with the river Volga and the city of St. Petersburg.

The most important canal in Russia is that of the Moskwa and Volga. The abundant produce of the fertile country which lies to the south and east of Moscow was, before the execution of this canal, conveyed to the Baltic by a very circuitous route. An artificial cutting of 100 miles saves 900 miles of river navigation. It extends from the Volga near Twer to the Moskwa near Moscow, making use of two portions of river navigation in its way. There are a few other canals on the outskirts of the empire.

Agriculture, Produce, Animals, and Minerals.—Russia produces much more grain than is required for its home consumption, and considerable quantities are exported, especially wheat and rye. The greatest portion of the latter is produced between the cataracts of the Dnieper on the south and the river Volga on the north. It is the common food of the peasantry throughout the empire. The cultivation of barley extends to 67° N. lat. Oats do not succeed north of 62° N. lat. Wheat is the principal object of agriculture in the fertile tracts along the rivers in the southern districts, but especially in the Ukraine or border provinces. Millet is extensively grown on the upper course of the Oka, Don, and Desna, and in a few other places south of 55° N. lat. At the southern extremity of Russia, and up to 48° N. lat., Indian corn is cultivated. Flax and hemp are more extensively grown than perhaps in any other country in Europe, both the climate and the soil being very favourable to their cultivation. The

oil extracted from the seeds of the latter is much used by the peasantry as food during the fasts, which altogether extend over nearly half the year. Tobacco is largely cultivated in the Ukraine, whence it is exported to the neighbouring countries. Until recent years agriculture was in a very backward state, and through defective communications it cost more to transport wheat from a short distance inland to Odessa than to bring it from that port to England. Reaping is now done by machinery, and threshing by threshers of the latest and most perfect model, while railways afford easy means of transit.

The climate of Russia is not generally favourable to the cultivation of fruit trees. With the exception of wild cherries and some bad apples, no fruits grow north of 56° N. lat. In the most southern districts there are peaches, apricots, quinces, mulberries, and walnuts; and in the numerous and extensive orchards of the Crimea there are also almonds and pomegranates. Grapes are grown in a few spots. Potatoes, cabbages, turnips, and carrots are extensively cultivated, and in some places cucumbers, pumpkins, radishes, and beet-root. Melons, asparagus, hery, and asparagus are also raised.

The forests constitute one of the principal sources of wealth to Russia, and their produce, consisting of timber, fire-wood, tar, pitch, pearl-ash, and turpentine, is exported to a large extent. About three-fourths of the country between 65° N. lat. and the course of the Volga as far east as its great bend near Casan, are covered with woods. The principal trees in this part of the empire are the pine, fir, larch, cedar, and birch, with a few limes; ash trees are rare. From this district is derived the greatest part of the produce of the forests which is sent to foreign markets. The central provinces have in most cases no more timber than is required for their own use. West of the Dniéper several extensive forests occur on the banks of the Niemen and in the swamps of Pinsk and Ratnor. The southern provinces of Russia are almost without trees, but timber is the chief article of internal commerce, and is floated down the rivers from the well-wooded districts. The empire being almost entirely dependent on its forests for manufacturing as well as domestic fuel, a very judicious system of foresting is necessary to guard against any possibility of exhaustion, and forests have been divided into districts allowing of a consumption for sixty years, at the end of which the timber will have attained maturity on the portion first felled.

The domestic animals common to England are also found in Russia, with the exception of rabbits. Horses are numerous, and of various breeds. In the southern provinces, whence the cavalry horses are brought, the breed is very superior. Most of the horses have hitherto been obtained from the half-wild studs of the Cossacks, Kalmycks, and Kuzlitz. The klans or hordes of these tribes often possess as many as 10,000. There is no country in Europe where so many cattle are reared as in Russia, and none where they are taken so little care of. In the central and southern provinces nearly every peasant has a few head, and even a beggar often has a cow or a goat. The ordinary Russian ox is small, lean, and bony; but those of the Ukraine, Podolia, and some other provinces, are large and of a very fine breed. Epidemic diseases are very prevalent in the southern districts. The *rinderpest*, or *steppe murrain*, which was brought into England and committed such havoc in 1865-66, has been known for many years in Russia, and has destroyed hundreds of thousands of animals. Sheep are very numerous, and wool and tallow are largely exported. The breed of sheep has been much improved by the introduction of fine-wooled animals from Germany. There are more goats in Russia than in any other country in Europe; their skins are made into morocco leather. Hogs are everywhere abundant, and in the more northern provinces especially, furnish a prin-

cipal part of the food of the people, while their bristles form an important article of export. The nomadic tribes which wander about in the steppes keep a great number of camels; some rich proprietors have herds consisting of more than 1000 head. Fowls, geese, and ducks are abundant; the two latter especially in those parts where there are numerous lakes and ponds. Reindeer are only kept north of 66° N. lat. The European bison still exists in the forest of Bialoviza, the only place in which it remains. In the extensive northern forests there are elks, deer, hares, and wild hogs. The wild animals, which are killed for their skins, are very numerous, and include bears, gluttons, badgers, wolves, foxes, martens, polecats, weasels, ermines, otters, squirrels, and marmots. In the steppes there are wolves, foxes, and wild hogs, wild asses, and saiga-antelopes. Nearly all kinds of birds which are met with in England occur in Russia, and also the capercaillie and pelican. The rearing and management of bees forms the principal occupation of several tribes. The wild bees are very numerous. They use the old and hollow trees in the forests for hives. Some individuals in the provinces of Kasan and Ouhva have as many as 100 hives in their gardens and 1000 in the forests. Honey is extensively used in many parts instead of sugar, and the export of wax is very considerable. On the Volga, the Don, the Sea of Azov, and the Caspian, the fisheries are highly valuable. Sturgeons of enormous size are taken, as well as the beluga, a cetacean from 12 feet to 18 feet in length, the largest known of all edible fish. Isinglass is prepared from the sounds or swimming bladders, and caviare from the roes. The latter is largely exported, besides which it is in great demand in Russia itself, being much used as food during the fasts.

Russia contains minerals in great abundance. Gold is found chiefly in the Ural Mountains, partly on the European, but mostly on the Siberian side. Platinum was discovered in the Ural in 1823, and has been worked ever since. Silver is met with only in the Asiatic governments. Copper and iron are extensively worked in the Ural Mountains, Finland, and other places. Mercury, arsenic, nickel, cobalt, antimony, and bismuth are met with, but are not much worked. Excellent china clay or kaolin is obtained at Gluchov, in the government of Tchernigov. Salt is found in various lakes, and a salt formation extends along the western declivity of the Ural Mountains to the source of the Kuma, and thence westward on both sides of the Ural. In all these districts salt is made from the salt springs, which are numerous. Coal exists in several places in large quantities, but hitherto has not been much worked. A great impulse, however, has been given to the development of coal resources by the prosperity of the beds discovered in 1870 in the government of Ekaterinoslav. They are of very large extent, and within easy reach of the Sea of Azov.

Manufactures, Commerce, &c.—The manufactures of Russia have been chiefly indebted for their encouragement and progress to the efforts of the government. Of late years their advance has been very rapid, and a growing tendency is discernible among the people to apply themselves to industrial pursuits, for while the agricultural interest remains almost stationary, the manufacturing industries from 1865 to 1885 augmented five times in value, being about 300,000,000 roubles yearly, or about one-sixth of the value of agricultural products, reckoned at about 1,800,000,000 roubles. St. Petersburg is the chief seat of manufactures. Common and morocco leather, the latter the best in Europe, are manufactured in about 5600 different works over the kingdom; cotton, linen, and silk goods at Moscow, St. Petersburg, Kaluga, Kiev, and in Poland; sailcloth, cordage, &c., at Archangel, Orel, and Novgorod; Cashmere shawls in Penza, Ekaterinoslav; carpets in Kursk, Smolensk, &c. The estimated produc-

tion of sugar in 1885-86 was 1,096,000,000 lbs., and there are an immense number of distilleries. Besides these, fire-arms, cutlery, glass, jewelry, paper, chemicals, and a great variety of other articles are made in various parts. Mineral oil is largely extracted from the shale found in great abundance near the Caspian Sea. The Russian iron manufacture is now important, and many of the extensive deposits of ore are singularly rich, and yield in the blast furnace from 55 to 68 per cent. of excellent iron. Skilled labour from abroad, especially from England, has been largely availed of, and iron shipbuilding is now actively carried on, especially on the shores of the Black Sea; while locomotive and other engines, and the iron material generally of railways, is far more often produced at home than formerly. An important branch of industry in the north is the preparation of forest products for exportation and winter use; and in the mining region of the Ural the utmost activity prevails, and improvement has been rapid.

It is the severity of the climate which has made the manufacturing industry a national want in many parts of Russia, and developed manufactures in the villages long before they were established in the towns. There are villages, for instance, in which all the peasants have been for generations either weavers, tanners, shoemakers, locksmiths, or cutlers, &c. The advantage of such village industry, and this natural union of agriculture and manufacture, is that the former is not deprived of its hands, and the peasant is not removed from his family. But the introduction of permanent stores, and travelling agents in place of annual bazaars, the increase in the use of machinery and production on a large scale, together with easy communication by rail, are rapidly interfering with these home manufactures and drawing the peasantry to industrial centres. From 1870 to 1885 the town population of the empire increased in the whole from 9,000,000 to 12,000,000. In 1870 the number of towns having more than 10,000 inhabitants was 185; in 1886 it was 310. In 1870 Russia numbered only six large towns consisting of more than 100,000 inhabitants; this number is now doubled. Mr. Mackenzie Wallace, however, states that a system exists whereby the peasantry, attracted to the larger towns and manufactories, remain there, though still regarded as members of their rural commune, possessing a share of the communal land, and liable for a share of the communal burdens.

The Russian customs tariff is decidedly protective, owing both to the policy of promoting home manufactures and to the pressing needs of the exchequer; but it is a bad omen that the volume of foreign trade, which in Russia depends directly upon the state of agriculture, is decreasing from year to year. The value of exports and imports in 1883 amounted to £114,600,000; in 1884, to £104,600,000; in 1885, to only £89,000,000. The exports are almost exclusively raw and agricultural produce, three-fourths of which are sent from the Baltic and southern seaports, chiefly to England and France. On the Asiatic frontier, however, Russian exports consist of manufactured wares, and here commerce is constantly and steadily increasing. Russia has lost its supremacy as a corn-furnishing country, America having driven it from the best trade and the first place. In 1867 Russia furnished 83 per cent. of the corn required by England; in 1876, 14 per cent.; in 1880, only 8 per cent. With France the Russian supply has diminished from 27 per cent. to 22 per cent.; with Germany, from 55 per cent. to 40 per cent. The principal articles of export are tallow; grain, particularly wheat; hemp and flax; timber, pot ashes, bristles, linseed, and hempseed, linseed and hempseed oils, wool, leather; fox, hare, and squirrel skins; canvas and coarse linen, cordage, caviare, wax, isinglass, furs, and tar. The principal imports are sugar, cotton, cotton stuffs, and yarn; machinery

and mill work, hardware and iron, coffee, indigo, and other dye-stuffs, woollens, oils, spices, wine, tea, lead, tin, coal and salt in large quantities, and linens and silks.

The commercial intercourse between Russia and the United Kingdom in recent years was as follows:—

Years.	Imports from Russia into the United Kingdom.	Exports from the United Kingdom to Russia.
	Northern Ports.	Northern Ports.
1883	£13,799,933	£6,459,993
1884	11,199,297	6,435,249
1885	10,931,926	5,295,751
	Southern Ports.	Southern Ports.
1883	£7,177,149	£1,169,890
1884	5,116,114	1,153,397
1885	6,777,500	944,939

The chief trading ports are St. Petersburg and Riga, on the Baltic; Archangel, on the White Sea; Odessa, on the Black Sea; Taganrog, on the Sea of Azof; and Astrakhan and Baku, on the Caspian. Moscow is the principal *entrepôt* of the interior trade of the empire, which is even more extensive and important than the foreign commerce, but of which no statistics are kept. The trade with China is mostly carried on through Kjachta, and the interior commerce is still kept up to some extent by means of annual fairs, the most important being those held at Nijn-Novgorod, Ibit, Kharkoff, and Poltava. In consequence of the increase of railway facilities these fairs are not, however, so largely attended as formerly.

Internal Communications, &c.—Before the introduction of railways, the elaborate system of water-communication afforded inexpensive means of carriage from the south to the north of Europe; while, with the exception of one or two breaks across the Ural range, the water communication from east to west was facile across the empire; that is to say, from the Neva to the Amur, and from the Black Sea to that of Japan. This method of transit is still very popular. The old tedious mode of progression is superseded by steam tugs, and there is a larger and better class of barges, many of which are of not less than 800 tons burden. Freight is very cheap; the wood for building costs nothing, the hire of the labourers is small, and the inland carrying trade very profitable. Much of the water-communication is, of course, suspended in the winter, but immense quantities of goods are then transported over the ice in sledges.

In 1836 the first railway—a short line from St. Petersburg to Tsarskoe Selo—was commenced. It was followed in 1837 by the Petersburg-Moscow line, the most luxurious line in Russia; and this again by the Warsaw-Vienna in 1859. In its making of railways the government insist upon strategic purposes being kept in view, to the detriment, frequently, of public and commercial convenience. Many lines have thus been turned from the only routes which would have enabled them to be self-supporting. In consequence railway construction has had to be undertaken directly by the state or under a state guarantee, and it is under the latter system that most of the Russian railways have been laid down. The actual sum which the government has to pay yearly varies according to the earnings of the lines, but often amounts to £5,000,000 per annum. The expense of railway travelling is not much more than half of what it is in England, but many of the stations are some miles from the towns whose names they bear. The long stoppages are very tedious. The telegraph has been extended all over the country, so that every place of importance is placed in communication with the rest of Europe.

There is a great want of good ordinary roads in Russia.

Owing to the climate the greatest possible difficulty exists in keeping them in proper repair, chiefly on account of the melting of the snows and overflowing of the rivers in the spring. During the winter the snow freezes and makes a capital and easy road for sledges; but on the return of spring the melted snow sinks into and softens the earth, which is also inundated by the rivers. The roads are thus rendered almost impassable until the soil has dried; and as heavy rains fall in the autumn and again soak the earth the period during which the roads can be made available is very limited. The macadamized roads between the largest towns are, it is true, kept in as good repair as the climate will permit, but our remarks are quite correct as applicable to all the ordinary roads of the country, and even to the main highways leading to the smaller towns.

The postal service in Russia is, as might be expected, very incomplete, and the number of letters carried is proportionately small. In an ordinary year the business amounts to about 100,000,000 letters, 3,000,000 post cards, and 100,000,000 newspapers and parcels.

Area and Population.—The Russian Empire comprises one-sixth of the territorial part of the globe, and about one-twenty-sixth part of its entire surface; but the superficial extent is obtained chiefly from estimates rather than from very accurate topographical surveys. Neither has any exact census been taken, the official statements of population being derived from enumerations made by the government in order to apply the new military laws of 1871-72. According to them the total area of the Russian Empire in 1882 was 8,159,931 square miles, and the population 102,970,000, or a little over twelve per square mile. In European Russia, however, the density is forty to the square mile; while in Asiatic Russia the population amounts to an average of only about two individuals per square mile.

The annexed table gives the area and population, according to the latest returns, of the various political and geographical divisions of the empire.

Provinces.	Area: Eng. sq. miles.	Population.
Pskov,	17,069	894,712
Ryazan,	16,255	1,713,581
St. Petersburg,	20,760	1,622,738
Samara,	58,321	2,224,093
Saratov,	32,624	2,118,077
Simbirsk,	19,110	1,471,164
Smolensk,	21,688	1,191,172
Tambov,	25,710	2,490,313
Taurida,	24,539	961,329
Tula,	11,954	1,340,866
Tver,	25,225	1,617,685
Tchernigov,	20,233	1,970,094
Ufa,	47,112	1,771,988
Vilna,	16,421	1,204,746
Vitebsk,	17,440	1,170,987
Vladimir,	18,864	1,352,140
Volhynia,	27,743	2,062,270
Vologda,	155,498	1,161,551
Voronej,	25,143	2,133,657
Vyatka,	59,117	2,740,953
Yaroslav,	13,751	1,082,782
Total, Russian Provinces,	1,887,614	77,879,521
Poland,	49,157	7,083,175
Finland,	144,255	2,112,093
Caucasus,	182,505	6,531,853
Total, European Russia,	2,263,531	93,639,912
RUSSIA IN ASIA—		
Siberia,	4,824,570	4,093,535
Central Asia,	1,371,830	5,237,351
Grand Total, Russian Empire,	8,159,931	102,970,831

Provinces.	Area: Eng. sq. miles.	Population.
EUROPEAN RUSSIA—		
Archangel,	331,565	315,367
Astrakhan,	91,327	790,338
Bessarabia,	17,619	1,419,762
Courland,	10,535	642,570
Dor. Region of the, . . .	61,886	1,474,133
Ekatomboslav,	26,118	1,697,061
Esthonia,	7,818	379,875
Grodno,	11,931	1,226,946
Kaluga,	11,912	1,110,337
Kazun,	21,601	1,955,590
Kiev,	19,691	2,507,231
Kostryama,	32,702	1,278,856
Koen,	15,692	642,570
Kursk,	17,937	2,314,390
Khar'kov,	21,941	2,160,263
Kherson,	27,523	1,865,164
Lvov,	18,158	1,173,951
Minsk,	35,293	1,569,312
Mogilev,	18,551	1,116,470
Moscow,	12,859	2,137,179
Nijni-Novgorod,	19,797	1,427,893
Novgorod,	47,236	1,127,881
Olonez,	57,439	327,323
Orel,	18,042	1,892,932
Orenburg,	73,816	1,196,133
Penza,	14,997	1,382,732
Perm,	128,211	2,539,874
Podolia,	16,224	2,276,518
Poltava,	19,265	2,473,958

The development of the empire has taken place partly by peaceful annexation of surrounding territories, and partly, but to a smaller degree, by conquest. The Russian policy has always been aggressive, and the dominion of the Czar has been gradually extended on the east towards British India, and in the south towards Constantinople. The following table gives a view of the extent of the Russian dominions at different epochs:—

	Square miles
In 1535, at the accession of John the Terrible, his dominions comprised,	818,400
n 1585, at his death,	3,168,000
n 1613, at the accession of Michael Romanov,	3,256,000
n 1645, at his death,	5,676,000
n 1725, at the death of Peter the Great,	6,160,000
n 1741, at the accession of Elizabeth,	7,150,000
n 1796, at the death of Catharine II.,	7,370,000
n 1855, at the accession of Alexander II.,	7,750,000
n 1891, at the accession of Alexander III.,	8,356,000

Only one-seventh of European Russia is well peopled, containing four-ninths of the entire population of the European provinces of Russia proper. The central, or "great" and "little" Russian provinces, which constitute the heart of Russia, are the most densely populated. These are the richest agricultural provinces, and they form the centre of the manufacturing industries of the empire.

The inhabitants belong either to the Caucasian or to the Mongol race. The Caucasian, however, is by far the most numerous. In fact, the nations of Mongol origin do not comprehend one-hundredth part of the whole population.

The Caucasian race in Russia consists of Slavonians, Tshudes or Finns, Tartars or Turks, Germans, Jews, and Greeks. Nine-tenths of the population belong to the

Slavonians. They are divided into Russians, Poles, Lithuanians, Letts, Wallachians, and Servians. The Russians constitute more than two-thirds of the entire population, and their number is estimated at above 50,000,000. Though generally diffused they are specially prominent in the central provinces, and speak a language subject to few dialectical variations considering the wide area over which it is spread, but one of extremely difficult attainment to the foreigner. Modern Russian writers use the German or French languages, which are commonly understood by the reading classes of society, and thereby secure for themselves a hearing at home and abroad.

Previous to the year 1863 the greater portion of the Russian inhabitants of the empire were serfs, or farm labourers attached to the soil, who might be bought, sold, or exchanged with it, and who were completely under the dominion of the "stick." These serfs, after acquiring some legal protection from tyrannical masters, were emancipated under certain conditions by an imperial edict, issued in 1861, which came into full operation in 1863. The owners of the serfs were compensated for their loss by a payment regulated in the following manner:—The previous labour of the serf was estimated at a yearly rental of 6 per cent., so that for every six roubles which the labourer earned annually, he had to pay 100 roubles to his master as his capital value to obtain his freedom. Of this sum the serfs had to give immediately 20 per cent., while the remaining 80 per cent. were disbursed as an advance by the government to the owners, to be repaid, at intervals extending over forty-nine years, by the freed peasants. The whole of these arrangements were completed at the end of July, 1865, so that from that date serfdom ceased to exist in Russia. Before the issue of the emancipation ukase (3rd March, 1861) there were 103,158 landowners in European Russia, who employed 9,797,163 serfs on their estates, besides 900,971 household servants, who, like the other serfs, were compelled to work for their masters, and formed part of their property. The total number of serfs, including women, was upwards of 22,000,000. Under the emancipation decree the land which had been formerly occupied by the serfs was to become their property after the payment, by instalments, of a certain amount of compensation. About one-third of the cultivable land in Russia proper is held by the state, one-fifth by landowners, and one-fifth by the peasantry.

Divisions of the People into Classes, and General Habits.—The inhabitants of Russia are generally divided into four classes:—(1) the nobles; (2) the clergy; (3) the merchants and burghers; and (4) the peasants.

The position of the Russian nobility is one which, with preconceived notions of Western aristocracy, it is a little difficult to understand. To find a nobility perfectly independent of the sovereign, and possessing any considerable amount of political power, we must go back to the old times when Russia was merely a collection of independent principalities, and when each reigning prince was surrounded by a group of armed men, composed partly of Boyars or large landed proprietors, and partly of knights or soldiers of fortune. In the early part of the sixteenth century, from being the voluntary adherents of a prince they became the subjects of a czar. Ivan the Terrible no longer asked their advice, but treated them as menials, and they were summarily flogged or executed according to the czar's good pleasure. When completely willing, however, to use their influence for the reigning house, they still met with much consideration from the earliest Muscovite czars. Peter the Great sought everywhere for intelligent and energetic, as well as obedient, instruments to carry out his designs. To noble birth and long pedigree he showed the most democratic, or rather autocratic, indifference; and finding a class who looked for special treatment on account of rank and lineage, he at once decided that all nobles should serve the

state in the army, the fleet, or the civil administration, under pain of being regarded and punished as traitors. Peter III. relaxed the Draconian edicts of his great predecessor, and abolished the principle of obligatory service; and his consort, Catharine II., went still further. She sought to gain the voluntary service of the nobles by honours and rewards, and to make them look upon the public service as a privilege instead of a hardship. In this she succeeded, but when she tried to turn the Russian *deorganised* into an imitation of the French *noblesse* she was not so successful. It was difficult for a class whose fathers and grandfathers had considered it no disgrace to receive corporal punishment, to be very deeply penetrated with the conception of noble blood or the sacred character of nobility, and in adopting the outward forms of culture the nobles gained but little in true dignity. With all Catharine's liberal phrases the nobles, as a class, never obtained even the shadow of political influence, and there was no real independence under the new airs of dignity and *hauteur*. Their position in the time of Paul I. showed clearly that the nobles were as dependent as ever on the will or caprice of the monarch, for the capricious son of Catharine lost no opportunity of showing his contempt for aristocratic pretensions, and of humiliating those who were supposed to harbour them. From the time of Catharine no important change was made in the legal status of the *noblesse*, and what chiefly distinguished them in the eye of the law from other classes was their privilege of possessing inhabited estates, *i.e.*, estates with serfs. This privilege having, by the emancipation law, been swept away, there is nothing now to distinguish them, except the title and a degree of culture rather beyond that of the burgher and merchant. Pride of birth, or the idea that it gives any right to political privileges or social consideration, is, to the Russian noble, absurd and ridiculous. Hence, although the Russian nobility, as a class, are larger in number than the nobility of any other country in Europe, it is often said that there is in reality no aristocracy in Russia. At all events the *noblesse* as a whole cannot be called an aristocracy; and if the term be used at all it can only be applied to a group of families which cluster around the court, and form the highest rank of the *noblesse*. Titles are very common, because the titled families are numerous, and all the children bear the titles of the parents even while the parents are still alive; but they are by no means always associated with official rank, wealth, social position, or distinction of any kind. The title of prince is borne by the descendants of Rurik and all the Tartar knights and boyars originally recognized by the czars. Counts and barons were first introduced by Peter the Great. Among the nobility there are some who are tolerably wealthy, but the majority are poor. There are hundreds of princes and princesses who not only have no right to appear at the Russian court, but who would be inadmissible in refined society at all. Other things, such as culture and ability, being equal, nobility certainly gives its members facilities for advancement in the public service and hence the majority of higher posts in the public service are filled by nobles; but the son of a small proprietor or of a parish priest may also rise to the very highest offices of state, while the descendants of the half-mythical Rurik may descend to the rank of peasants. At the death of parents landed property is divided among the children.

We have dwelt the more largely upon the curious position of the Russian nobility, because it has an important bearing upon the present and future constitution of the empire. The *noblesse* class numbers altogether nearly 1,000,000, and so permeates society that to a very great extent its interests are identical with those of all other classes of Russians. There is but little aristocratic sentiment either in the people or the nobles; and so far as the latter have any aspirations they aim at securing the political

liberty of the people as a whole, rather than at acquiring rights and privileges for their own class. The czar may be said to hold the singular position of being the only truly despotic monarch in Europe. A great feature, however, in Russian life is the number of secret societies—the most formidable of which is that of the Nihilists, which aims not only at the overthrow of despotism, but at the total subversion of society.

The clergy are more fully referred to under *Church and Education*.

Merchants and burghers form a class which it has been the aim of Muscovite rulers to create and increase from the earliest of the czars downwards. The real object, however, was in the first instance only to form a rich taxable community; and the inordinately heavy taxes, laid on with true Oriental short-sightedness, defeated the purpose by driving the merchants from the towns, and indeed from the empire. Peter the Great went more cautiously to work. Foreign artisans were imported into his dominions, and foreign merchants were invited to trade with his subjects; young Russians were sent abroad to learn the useful arts; efforts were made to disseminate practical knowledge by the translation of foreign books and the foundation of schools; all kinds of trade were encouraged, and various industrial enterprises were organized. At the same time the administration of the towns was thoroughly reorganized after the model of the ancient free towns of Germany. Catherine followed in the same track, with the addition of evincing a sort of mania for the formation of towns. No less than 216 were formed out of villages in the short space of twenty-three years, and each of these received imperial charters, municipal institutions, with burgomasters, town councils, courts of justice, guilds for the merchants, trade corporations for the artisans, and an endless list of instructions regarding the development of trade and industry, the building of hospitals, sanitary precautions, the founding of schools, the dispersing of justice, the organization of the police, &c. As might well be supposed, most of those upon whom these multifarious municipal privileges were conferred were only bewildered by them. The whole system was arbitrarily imposed upon the people, and had no motive power except the imperial will—presenting thus a characteristic trait of Russian historical development.

These efforts of the government were, however, so far successful, that much of the legislation of both Peter and Catherine as regards merchants and burghers still exists in full force. Any one who wishes to engage in commerce inscribes himself on a guild, and as soon as he has paid the required dues he becomes officially a merchant. Ceasing to pay these dues he ceases to be a merchant in the legal sense of the term, and returns to the class to which he formerly belonged, which might be that of a noble, a burgher, or an artisan. The latter form the connecting link between the town population and the peasantry. Many of the merchant class are very rich, exceedingly ignorant, fond of display, and bear a very indolgent character for honesty. There are numerous symptoms, however, of a change for the better.

The *peasants* form by far the largest portion of the inhabitants of Russia, and the peculiar organization under which they live forms one of the most singular paradoxes in the world. Russia is of all countries the stronghold of Cæsarian despotism, and of a centralized bureaucracy which strives to regulate minutely all departments of the national life; and yet the *Mir*, or village communes, containing about five-sixths of the population, are the most perfect existing specimens of representative constitutional government of the extreme democratic type! The head of the commune is the elder, but he merely represents the executive power. All real authority resides in the assembly, of which all heads of households in the village are members. The meetings take place on Sundays or holidays, and any open

space where there is sufficient room serves as a forum. Speech-making is rarely attempted, and the usual proceedings are of the most free and easy character. If the assembly is divided and cannot agree by acclamation, a decision is taken by a majority of votes.

In a Russian village it is impossible for one peasant to have little or no interest in his neighbour's business, for the system is very much the primitive one of having all things in common. The land belongs not to individuals, but to the commune, and is periodically divided by the assembly between the members of the village. In like manner the government levies a certain amount of taxes upon the commune, and there is a common responsibility among its members for all the taxes and communal obligations. The assembly discusses all matters affecting the communal welfare, and as these matters are never legally defined its competence is very wide. It fixes the time for making the hay, or reaping the crops, or ploughing the land, deals with those who do not pay their taxes, inquires into proposed building on the communal land, and into the domestic affairs of the villagers if it thinks necessary, and elects the elder, as well as the communal tax-collector, watchman, and herd-boy. No peasant can permanently leave the village without the consent of the commune, nor be absent at work elsewhere, even temporarily, without permission, and he may be recalled by a communal decree, and this power is said to be used sometimes as a means of extortion.

An assembly with functions so varied and comprehensive is inevitably sure to give many decisions which, however just, appear hard and repugnant to the peasants concerned, especially as private rights, if it appears needful, are most ruthlessly sacrificed to communal interests. But though peasants may set at defiance the authority of the police, of the provincial governor, or of the central government, they invariably bow unreservedly to the will of the *Mir*.

The commune is regarded by many intelligent people as one of the great institutions of the future, and as almost a panacea for social and political evils. But though it has survived for centuries in Russia, it appears questionable whether it will much longer remain without serious modifications. With the growing tendency to migrate from the village to the town, the operation of the commune is frequently felt to be irksome; while the more education spreads, and the more the peasantry become acquainted with the habits of society elsewhere, the less will they relish an institution which controls almost every trivial movement of their lives.

The most usual dress of the peasants consists of a long coarse druggot coat, fastened by a belt round the waist, but in winter they wear a sheep skin with the woolly side inwards. Their trousers are of coarse linen; instead of stockings woollen or flannel cloth is wrapped round the legs, and boots or shoes of matted linden bark are frequently substituted for those of leather. The neck, even in winter, is bare, and the head is covered by a peaked round hat or cap.

The Russian peasantry are, as a rule, extremely superstitious, and holy water and sacred pictures, to which all marks of outward devotion are paid, may be found in every cottage; and even the bacchanalian proceedings of the *rotki* store are overlooked by the indispensable saintly picture. Although possessed of but little active vigour or steadiness of purpose, the peasant has great capacity for endurance, and a wonderful talent for imitation. Give him a model to be precisely reproduced, and he will produce it, from a padlock to a watch. The speciality in which he excels is carpenter's work; and with an axe he will do wonders, often using no other tool in building and furnishing his house complete. Exceedingly quick as they are in adopting the manners, customs, and dress of more civilized people, when brought into contact with

them, and wanting in neither courage nor ambition, there is no reason why the Russian peasants may not become a class at least equal to the average.

There is throughout the empire such a high rate of infant mortality that the ratio of increase of population in Russia is lower than that of nearly every European country. In Western Europe, according to the estimates of the best authorities, every man lives, on an average, about forty years. In Russia, on the other hand, even in the healthiest regions (that is, the extreme north and west), the average varies from twenty-two to twenty-seven years. Along the basin of the Volga, again—and, indeed, in the south-eastern provinces generally, where life has to be sustained under highly unfavourable circumstances—the average duration falls as low as twenty years; while in the governments of Perm, Viatka, and Orenburg, it is only fifteen! Hence it follows that while the annual mortality of the Russian Empire is as 1 in 26, the annual increase of the population is only $1\frac{1}{2}$ per cent.

Various causes are assigned for this deplorable state of things by the Russian experts, among which may be mentioned the severity of the climate, the injudicious system in vogue among the wealthier classes in bringing up their children, the hard work which the peasantry exact from their wives, and the fact that their hard and scanty food is even further diminished by the constant fasts of the Greek Church, recurring twice or occasionally even three times a week, for in the calendar of the Greek Church no fewer than 210 days are marked as fasts.

Government.—The government of Russia is an absolute hereditary monarchy. The whole legislative, executive, and judicial power is united in the emperor, whose will alone is law. There are, however, certain rules of government which the sovereigns have acknowledged as binding. The chief of these is the law of succession to the throne, which, according to a decree of the Emperor Paul, of the year 1797, is to be that of regular descent, by the right of primogeniture, with preference of male over female heirs.

The administration of the empire is intrusted to four great boards or councils, possessing separate functions, but centring in the Private Cabinet of the Emperor. The first of these boards is the *Council of the Empire*, established in its present form by Alexander I., in the year 1810. It consists of a president and an unlimited number of members appointed by the emperor. At present there are forty-two, exclusive of the members who have a seat *ex officio*, and of the princes of the imperial house, who can claim the right to be present at its deliberations. The council is divided into three departments, namely, of legislation, of civil administration, and of finance. Each department has its own president and a separate sphere of duties, but there are collective meetings of the three sections. The chief function of the Council of the Empire is that of superintending the action of the general administration, of watching over the due execution of the laws of the realm, and of proposing alterations and modifications of the same whenever necessary.

The second of the great colleges, or boards of government, is the *Directing Senate*, or "*Pravitelstvennyi Senat*," established by Peter I. in the year 1711. The functions of the senate are partly of a deliberative and partly of an executive character. It is the high court of justice for the empire, controlling all the inferior tribunals. In a few cases, however, parties dissatisfied with its decisions may petition the emperor. The senators are mostly persons of high rank, or who fill high stations; but a lawyer of eminence provides over each department, who represents the emperor, and without whose signature its decisions would have no force. The senate examines into the state of the public revenue and expenditure, and has power to inquire into public abuses, to appoint to a great variety

of offices, and to make remonstrances to the emperor. Monthly reports of its proceedings are published in the official *Gazette*.

The third college, established by Peter I. in the year 1721, is the *Holy Synod*, and to it is committed the superintendence of the religious affairs of the empire. It is composed of the principal dignitaries of the church. All its decisions run in the emperor's name, and have no force till approved by him. The president of the Holy Synod is the metropolitan of Novgorod.

The fourth board of government is the *Council of Ministers*. It is divided into eleven departments—viz., the court, foreign affairs, war, navy, interior, public instruction, finance, justice, imperial domains, public works, and general control. All the heads of the departments communicate directly with the sovereign.

The local administration differs in different provinces; the government having sometimes allowed conquered or annexed countries to preserve their own laws and institutions, except in so far as they were hostile to the general constitution of the empire. The Grand-duchy of Finland has a special and partially independent form of government; and the provinces wrested from Sweden by Peter the Great and Courland have institutions and privileges peculiar to themselves.

The other portions of European Russia are divided into provinces or governments, and each government is subdivided into districts of varying size and population. Over each province is placed a governor, who is assisted in his duties by a vice-governor and a small council, and who is the local representative of the ministry of the interior. In each government there are also a number of resident officials, who represent the other ministries, and each of them has a bureau, with the requisite number of assistants, secretaries, and scribes.

To keep this vast and complex bureaucratic machine in motion, it is necessary to have a large and well drilled army of officials. These are drawn chiefly from the ranks of the *noblesse* and the clergy and form a peculiar social class called "*Tchinovniks*." The *Tchinovniks* are divided into about a dozen grades, and members of the highest of these grades are the most considerable persons in Russian society.

In our remarks upon the peasantry we have already referred to the institution of the "*Mir*," or commune, which regulates the affairs of each village. There are many public works, however, beyond the jurisdiction or powers of any single commune, but which would probably never be carried out at all if left to the initiative of the governor of the province, especially when the province occupies an area equal to the whole of Great Britain. With this view a system of local self-government was devised some years since. The governments were divided into districts, and the local affairs of each district placed in charge of a "*Zemstvo*," the members of which are elected once every three years in certain fixed proportions by the landed proprietors, the rural communes, and the municipal corporations. Peasants may be elected to this local parliament, and frequently are; but attendance involves some pecuniary sacrifice, and as payment to deputies is absolutely forbidden, it is landed proprietors who are generally chosen. The principal duties of the *Zemstvo* are to keep the roads and bridges in proper repair, provide means of conveyance for the rural police and other officials, elect the justices of peace, look after primary education and sanitary affairs, watch the state of the crops and take measures against scarcity and famine—to undertake, in fact, whatever seems likely to increase the material and moral well-being of their district. Sessions of the *Zemstvo* must be held at least once, and are frequently held three times, in the year. Taxes, within certain limits, may be imposed to meet the expenses of these district assemblies.

The Zemstvo has not fully answered the expectations formed of it, nor is the institution universally popular throughout the empire. For this two reasons are assigned, first, that as usual with most Russian reforms, they were established long before the public at large felt the need of them or were in a condition to appreciate them—the Russian government thinking, apparently, that it could obtain for the country all the favourable conditions of the most advanced European civilization by copying the most liberal features of local self-government; and secondly, that no sooner was the Zemstvo established than the government took fright at the possible political influence it might exert; some members of the St. Petersburg Zemstvo were severely punished for meddling with politics; the assemblies were forced to accept government nominees as presidents, and considerable restrictions were placed on their freedom of action. Members elected to a Zemstvo, feeling that they were thus only brought within a new form of government control, and that they had little independence of action, naturally became somewhat indifferent to the honour of serving. As, however, the Russian government has the best of intentions to promote the efficiency of the Zemstvo, these features may in time be changed; and, if so, the Zemstvo will then acquire vigorous and healthy vitality as the people come to feel more and more the need of those things which it was intended to supply.

Formerly the Russian legal system was absurdly complicated, and the iniquities carried on according to the obsolete forms of medieval law were almost too monstrous for belief. The Emperor Nicholas set the machinery of reform in motion by the establishment of an excellent school of jurisprudence for the education of young men to the profession of the law. At the basis of the system are the *procurators of the peace*, elected by the inhabitants of each district for three years. From these there is an appeal to the assembly of the justices of the districts if the amount exceeds £2. For more serious cases, involving matters of law, there are the regular tribunals with courts of appeal in civil cases alone; but in criminal cases, where they are assisted by a jury, their decision is final. There is a final appeal on questions of procedure only to the senate. Trials are public, and oral prosecution and defence are permitted. In civil cases there are two kinds of advocates—*baristers* and *licensed practitioners*—but their professional standard is not very high. In criminal suits anyone may act as counsel. Confidence in the administration of justice is not complete, and the representatives of the minister of justice, whose function it is to conduct government prosecutions and to defend state interests in every court, exercise much influence. Owing to the inelasticity of the criminal code, which the judges have no power to mitigate according to circumstances, juries sometimes find verdicts of acquittal in face of obvious guilt, because the code punishment would be excessive.

There are *procurators* in Russia, especially in the great towns, a very different system of police. The officers are empowered to discharge various functions besides those which come more particularly within their province, such as the settlement of disputes between masters and servants. Crime is not very frequent, and property is well protected. Capital punishments are rare, treason being the only crime visited with death. In cases of murder, arson, and other capital crimes, the criminal, after receiving a certain number of lashes, is condemned for life to forced labour in the mines of Siberia.

Throughout all the concessions and privileges granted by successive sovereigns of Russia to their people, it is to be observed that they have invariably refrained, in the most careful and jealous manner, from granting political liberties. The great work of emancipating the serfs, by diminishing the importance of the nobles and great land-

owners, left the emperor more than ever Autocrat of Russia.

The title of Czar (properly *Tsar*) is a Russian translation of the Oriental *Khan*, having nothing to do with the Latin *Cæsar*. The Russian crown domains consist of more than 1,000,000 square miles of cultivated land and forests, besides gold and other mines in Siberia, and producing a vast revenue, the actual amount of which is, however, unknown, as no reference to the subject is made in the budgets or finance accounts, the crown domains being considered the private property of the imperial family. The sum total of the income of the imperial family is estimated at £2,450,000 sterling. About £450,000 are spent in charities, schools, theatres, &c., leaving a net revenue of £2,000,000.

Church and Education.—The Russian Church is a branch of the Eastern or Greek Church, whose missionaries seem to have penetrated among the Slavonian population who inhabited the countries to the north of the Black Sea at an early period, and to have made many converts before the end of the ninth century. The established religion of the empire is officially called the Orthodox-Catholic Faith. The Russian Church separated from the see of Rome in 1054, and from the Byzantine patriarchate in 1589. It has its own independent synod, but maintains the relations of a sister church with the four patriarchates of Constantinople, Jerusalem, Antioch, and Alexandria. The sacred synod, the board of government of the church, was established with the concurrence of the Russian clergy and the four Eastern patriarchs.

There have been three epochs in the government of the Russian Church. At first it had a foreign head, the patriarch in Constantinople, who appointed the metropolitan of Kiev, and afterwards of Moscow; during the second period, commencing in 1589, it was governed by a patriarch appointed by the czar, but nearly independent; lastly, the direction of the church was transferred to the emperor. Although not the head of the church in the same sense as the Pope of Rome, he exercises the external functions in a still greater degree than that pontiff; but he has never claimed the right of deciding theological and dogmatic questions. In the case of any new heresy springing up in Russia requiring a judgment, the emperor cannot pronounce a decision, but this duty appertains to the synod; and, if the question is critical, the opinion of the four Eastern patriarchs must be consulted, and finally a council has to be convened. The judgment of the church being once given, the emperor must command its execution. In official documents the emperor never calls himself the Head, but only the Protector or Defender of the Church.

The points in which the Greco-Russian Church differs from the Roman Catholic faith are, its denying the spiritual supremacy of the Pope, its prohibiting the celibacy of the clergy, and its authorizing all individuals to read and study the Scriptures in their vernacular tongue. From statistical reports published in Moscow in 1881 it appeared that of the Orthodox Greek Church there were then fifty-nine dioceses in the empire, besides one in North America. They were administered by three metropolitans, nineteen archbishops, and thirty-five bishops, with twenty-seven coadjutors. There are 620 cathedrals, and 90,000 churches attached to the established faith, with 90,000 clergy of all kinds. The holy synod has a capital of about £5,000,000 sterling at its disposal. The "orthodox" population amounted to 62,000,000.

The Russian Church formerly possessed immense wealth, but it was partly confiscated by Peter I. and Catharine II. The latter sovereign appropriated its whole movable property for the use of the state, assigning, in compensation, pensions to the chief ecclesiastical dignitaries. The sum allowed as stipends to the clergy by government is so very small, that they are almost wholly dependent on their

flocks. The revenue even of the senior metropolitan, the highest dignitary in the hierarchy, does not exceed £700 a year; and an archimandrite or abbot, the class next below a bishop, has not generally more than from £40 to £50 a year. In the poorer benefices, besides the fees—which only amount to from £1 to £20 a year—the clergy have but a wooden house similar to that of the meanest of their parishioners, and a small portion of land, which they generally cultivate with their own hands; while the highest dignity to which they can ever attain, so long as they continue married, is that of a prototype of a cathedral, whose income scarcely exceeds £20 a year. It should be stated, however, that many of the humbler clergy are very ignorant, and in remote districts often, like their flocks, too much addicted to strong potations of corn brandy.

In the architecture of the sacred edifices, the Byzantine style, with its single or clustered domes, is more or less conspicuous. The interiors of the cathedrals and churches in the cities and great towns are splendidly ornamented, and the services conducted with great pomp and ceremony. Pictures of the Virgin and popular saints are suspended on the walls, to which the people pay great veneration, bowing to them and lighting tapers before them, the latter being always on sale on the spot for the purpose. Paintings are also hung up and similarly honoured in the thoroughfares, the shops, public offices, and dwellings. Easter is the grand festival—a carnival season.

Mr. Mackenzie Wallace remarks, as the result of his observation, that the Russian feeling as regards religion differs from that with which we are acquainted—at all events, so far as the common people are concerned. The Russian peasants are utterly ignorant and grossly superstitious. Of anything like an "inner religious life" they have not the faintest conception. All that they expect of their priest is that he should conform to certain observances, and perform punctiliously the rites and ceremonies prescribed by the church. He scarcely ever preaches—if he even wishes to preach, his sermon must be in the first place submitted to a kind of archdeacon; and very few priests have, or ever seek to obtain, any moral influence over their flock.

There are numerous dissenters from the Russian Church, but the government has long steadily aimed at securing as large an incorporation of the people as possible within the pale of the established church, though, with the exception of the restraints laid on the Jews, all religions may be freely professed in the empire. The dissenters have been and are still, however, severely persecuted, though recently some liberty has been extended to those of the United Church. It is estimated that there are more than 12,000,000 dissenters in Great Russia alone. They are known by the general name of *Raskolniki*. The main body arose soon after the middle of the seventeenth century, when the Slavonic Scriptures and the liturgical books of the church, having become exceedingly corrupt in the process of transcription, were revised by an ecclesiastical council, and the purified texts were ordered to be alone used in the churches. This measure, wholesome in itself, met with opposition. Thousands, both of the clergy and laity, revered the antiquated copies, however corrupt, simply because they were ancient; and preferred separation to conformity. Hence arose the *Raskolniki*, an imposed and not an adopted title, as the seceders style themselves by terms signifying "adherents to the old faith" or the "old rite." Mr. Mackenzie Wallace estimates their number at 7,000,000; but the latest official return only admits 1,100,000. A branch of the *Raskolniki* are the *Philippins* or *Starovery*, who are chiefly settled in Lithuania. The other nonconformists are the *Stanulki* ("Wanderers") or *Beguny* ("Fugitives"), who call themselves *Christoviye Lyudi* ("Christ's People"), or belong to minor denominations (*tolki*), differing on minor tenets. The Roman Catholics,

who are chiefly Poles, are returned at 8,500,000; the Mohammedans or Turkish tribes in the south and east, at 2,800,000; the Protestants, principally Lutherans in Finland and the Baltic provinces, at 3,000,000; the Jews at 3,000,000. The Protestants are principally in the German or Baltic provinces. The harsh laws and restraints formerly laid upon the Jews have been much relaxed of late years. The Mohammedans are chiefly found in the governments of Astrakhan, Kazan, Orenburg, Ufa, and Ural; but they are very generally distributed in smaller numbers throughout most other parts of the empire. This great admixture in the population in all parts of Russia must not be lost sight of when estimating the influence and means of action of the Russians in Central Asia. They are, in fact, an Eastern as well as a European nation, and Asiatics find themselves more at home here than they do in any other country in Europe.

The education of the people is still very backward. Finland, however, is markedly in advance of the rest of the empire. A plan for a national system of instruction was laid down in a ukase of the Emperor Alexander, issued in 1802; which, though it has undergone various modifications, contains the outline of the system that is still followed. The empire is divided, in respect of education, into a certain number of districts, each of which has, or is intended to have, a university, with a certain number of lyceums, at which the young men intended to fill civil offices are mostly instructed, besides gymnasia, high schools, and elementary schools, varying according to area and population. The chief districts are those of St. Petersburg, Moscow, Kharkov, Kasan, Dorpat, Kiev, Odessa, Warsaw, Wilna, and Siberia; but of these only the first eight have universities. A curator or inspector is placed at the head of each district, who is in constant communication with the minister of public instruction. The subjects and courses of study, the examinations to be gone through, and the fees to be paid, are all fixed by government.

Army and Navy.—The military system is based upon universal compulsion. Liability to serve commences at the age of twenty-one, the only exception being the Cossacks, who have a special organization not greatly differing from their former irregular and semi-voluntary service. The "contingent" annually called out may vary according to circumstances, but is divided into two unequal parts, 25 per cent. of the recruits in each year being taken for the field army, and 75 per cent. for the local troops, which are destined to form the reserves. The 25 per cent. taken for the field army have to give fifteen years of service, six of which are supposed to be passed with the colours, though in reality the men are on furlough during the fifth and sixth years. Up to the end of the eighth year they belong to the first reserve, and for the next four years to the second reserve, which is intended to form battalions ready to supply losses in the field, and thus feed the active army. The remaining three years of service are to be passed in another portion of the reserve liable to be used as circumstances may direct. The first reserve fills up the regiments when mobilization is ordered, the second reserve supplies losses in the field or hospital; the remainder may either be used like the second reserve or form new divisions if required. It must not be supposed that the 75 per cent. escape service. They also serve fifteen years, but only in their own districts, where they undergo a certain amount of instruction, and in case of war are called up to form local reserves. When the fifteen years of service is past all the men of the contingent (both the 25 and 75 per cent.) fall for the next five years into the *landwehr*, which also includes all Russians not forming part of any of the annual contingents. Volunteers, as in Germany and France, may join the service earlier than their twenty-first year, and are only kept in the ranks for a period varying from three months to two years, according to their education and military aptitude. A lad may

volunteer when he is seventeen years old, and go home before he is eighteen. This institution of short-service volunteers is a sort of safety-valve, guarding against the pressure of universal liability upon the well-to-do classes. The reserves, after their first training, may be called up twice to attend manœuvres, but cannot be kept longer than six weeks for each manœuvre. The landwehr cannot be called out at all in time of peace.

The nominal strength of the various divisions of the Russian army, according to the most recent official returns, was as follows:—

	PEACE FOOTING.		WAR FOOTING.	
	Officers.	Men.	Officers.	Men.
Active army, . . .	19,771	532,764	21,228	986,373
Reserve,	3,536	68,786	9,291	563,373
Depôt troops, . . .	351	11,861	2,511	79,088
Local troops, . . .	1,625	59,625	1,983	99,067
Instruction troops, .	59	1,132	6	295
Cossacks,	1,984	49,962	3,356	141,969
Irregular troops, . .	139	5,637	143	6,188
General total, . . .	27,468	729,770	41,551	1,876,353

The landwehr amounts to nearly 1,500,000 men (250,000 being old soldiers), which brings the Russian military forces to a total of nearly 3,400,000. If we count only the 250,000 old soldiers in the landwehr as being really effective, there still remains the colossal number of over 2,100,000 trained men available for war.

Officers are promoted by seniority up to and including the rank of lieutenant-colonel. The czar then selects for the higher ranks until the officer becomes a general, when seniority again comes into play. The rank of field-marshal is, as usual, reserved for those who have rendered the highest service at the head of armies in the field.

The high scientific and tactical instruction given to the officers is fully equal to that prescribed for the German officers; while the admixture of elementary instruction and thoroughly practical military training given to the men almost exceeds that carried out in the Prussian system. The Russian soldier has always been specially remarkable for dogged resolution and enthusiastic devotion to the sovereign.

The Russian navy consists of two great divisions, the fleet of the Baltic, and that of the Black Sea. Each of these two fleets is again subdivided into sections. There are also several naval establishments on the Caspian Sea, in the North Pacific, and on the Amur.

Since the Crimean War the most strenuous efforts have been made to increase the naval power and capacity. Vessels of the newest construction have been built or bought, and no expense or pains have been spared by Russia to keep pace with the navies of other nations. The fleet of the Baltic comprises thirty-eight vessels—thirty-one in the Baltic and seven in the Black Sea—was made up at the end of 1885, of the following classes of ships:—

	Armour thickness, Inches.
1st Class: Six vessels (one of which has only 16-inch armour,)	14 to 16
2nd Class: Ten sailing cruisers,	4½ to 7
3rd Class: Eighteen vessels for coast defence,	4½ to 6
4th Class: Two circular monitors,	9 and 16
5th Class: Two gun-vessels,	3½

The sailors of the imperial navy are levied, like the army, by conscription; as many, however, as possible are enlisted

voluntarily, and the crews furnished by Finland are obtained altogether in this manner. The period of service in the navy was formerly twenty-two years, but was reduced in 1856 to fourteen years. In 1873 it was further reduced to nine years—seven in the active navy and two in the reserve.

Revenue and Expenditure.—It is most difficult to obtain correct information as to the actual financial condition of Russia. Official estimates are published at the end of each year, giving the presumed revenue and expenditure of the following twelve months; and an official review of the actual revenue and expenditure is issued by the comptroller of the empire ten or eleven months after the close of the year to which it refers. The financial world, however, looks with suspicion on accounts which it has no means of verifying; and taking even the official returns as they are published, it is no easy task to unravel their exact meaning, in consequence of the number of special funds, extraordinary credits for special purposes, supplementary credits, &c., into which the national accounts are divided and subdivided.

The ordinary receipts of late years have averaged between £65,000,000 and £72,000,000 per annum, and the expenditure has usually been considerably in excess. The total liabilities of Russia in 1884 were as follows:—Consolidated debt, £237,000,000; current debt, £139,300,000; railway debt, £107,100,000; redemption operations, £50,000,000; total, £523,100,000. The two heaviest burdens on the resources of the empire are the sums required for payment of the interest on the public debt and the sums required for the maintenance of the army. These two items of expenditure alone absorb £50,000,000, in about equal proportions, out of a total of ordinary or annual expenditure of £72,740,000. The nominal value of the rouble is 3s. 2d., but its exchange rate is often not more than 2s. The principal branches of revenue are duties on spirits, customs, and direct personal and land taxes; the heaviest items of expenditure being on account of the army, navy, and public debt.

Russian Language.—This is the most important of the SLAVONIC LANGUAGES. It belongs to the Eastern branch, which includes Russian, Bulgarian, Servian, and Croatian. The Bulgarian has the oldest records; its Bible of the ninth century is far older than any other Slavonic text, and is the accepted version in all the Slavonic divisions of the Greek Church. The Russian remains only extend back to the eleventh century, though some southern specimens claim a more remote date. Distant as it seems from our own speech, yet Russian (with Slavonic tongues generally) is a member of that Indo-European family of tongues to which we ourselves belong. An illustration of the Russian alphabet is given on the next page. It is at once seen to be a mere variation of the Greek alphabet, and was introduced from Bulgaria by Vladimir (980-1015). It is in essentials the invention of the Monk Cyril, about 850.

History.—At a very early date Russia appears to have been colonized by various Slavonic tribes, who were chiefly settled in the neighbourhood of the upper waters of the Don, Dnieper, Dniester, and Bog, and whose principal towns were Kiev and Novgorod. In the sixth century from the birth of Christ, the Khazari, pressed upon by the Avari, entered the country between the Volga and the Don, and conquering the Crimea, established themselves in close contiguity to the Byzantine Empire. These and numerous other tribes, migrating westward, forced the Huns into Pannonia, and occupied the plains between the Don and the Atlanta, while the northern districts were colonized by a branch of the Finnic race, called the Tshudes. All these tribes were nomads, subsisting by pasture and the chase.

Beset by the Avari, the Khazari, the Tshudes, and other fierce and restless peoples, the Slavs of Novgorod, like the

ancient Britons, sought help from abroad, and by so doing brought upon themselves the iron yoke of conquest. They despatched embassies, in 862, to the Varagi or Varangians (Scandinavians), inviting their chiefs to come to their aid. Three brothers, whom the old chronicles name Rurik, Sennaj, and Truvor, accepted the invitation, and at the head of a body of warriors seized upon Novgorod, of which Rurik was soon afterwards recognized as the grand-duke.

А	a
Б	b
В	v or f
Г	gh
Д	d
Е	e or ye
Ж	.
З	z
И	i or e
І	i or e
К	k or c
Л	l
М	m
Н	n
О	o
П	p
Р	r

С	s
Т	t
У	u oo
Ф	f ph
Х	ch
Ц	ts
Ч	tsh
Ш	sh
Щ	stsh
Ъ	ø
Ы	ui
Ь	ö
Э	ye
Ю	x
Я	ksi
Ѧ	ps
ѧ	th
Ѩ	v

Russian Alphabet.

His followers mixing with, and being absorbed among, the old Slavs, their union established the modern Russian race.

Rurik died in 879, and was succeeded by his son Igor, who conquered Kiev, made it the capital of his empire, and subdued the neighbouring tribes. Thrice did these terrible barbarians attack Byzantium, and thrice were they repulsed. At least these achievements took place in his reign, but were virtually effected by his regent, Oleg. Igor was succeeded by his widow Olga (915-957), a woman of powerful and masculine mind, who did much towards the consolidation of the new state, embraced Christianity, and was baptized in 955 by the patriarch of Constantinople. She abdicated (957) in favour of her son Sviatoslav, a pagan but a wise and politic ruler, who conquered Bulgaria, and menaced Byzantium, penetrating as far as Adrianople. He was driven back by John Zimiskēs, and was slain in an ambushade by the Peshenegri in 972.

A brief period of intestine convulsion followed, through the quarrels of his three sons, but ultimately Vladimir, the youngest, became sole ruler. In the Russian chronicles he fills the niche that is occupied by Charles the Great in Frankish, and by Arthur in English history. Legends and poetic fictions have gathered round him, and invested his reign with a sunny atmosphere of fable. It seems certain, however, that he extended the boundaries of his empire to Lake Ilmen on the north, the mouths of the Oka and the

Khoper on the east, the Vistula-sources on the west, and the falls of the Dnieper on the south. Having embraced Christianity with all his subjects, he received the name of Basilus, and wedded the Princess Anne, sister of the Greek emperor Basil II. (988). Thenceforward Russia was regarded as belonging to the patriarchate of Constantinople, and a Greek archbishopric was founded at Kiev. To this prince it is due that Russian is written in the ancient Greek alphabet, slightly modified to accommodate Slavonic sounds. Vladimir cultivated letters and the arts of peace, and his zealous exertions to promote the spread of the new creed he had embraced procured him the honourable appellation of the Saint. It is strange that so wise a ruler should have committed the error of dividing his dominions at his death among his four sons (1008). The natural result was a long and bitter civil war. Out of this (in 1036) Jaroslav, prince of Novgorod, emerged successful. He distinguished his reign by codifying the laws, founding schools, and ameliorating the condition of his subjects. He gained the title of the Great, and his court was in no wise inferior to those of his contemporaries, Edward the Confessor and Henry I. of France, while his dominions far exceeded theirs in size. But he, too, at his decease (1054) split up his territory among his children, who established several small independent principalities, which singly were unable to cope with the Poles and other enemies, and suffered severely from frequent invasion, besides destroying the unity of the country for close upon 200 years. These states were—Tver, Rostov, Vladimir, Seversk, Tchernigov, Riazan, Murom, Smolensk, Polotsk, Volhynia, Galicia, Novgorod, and Kiev, the latter exercising a nominal supremacy over the others. Novgorod, however, was virtually independent, chose its own dukes and princes, and developed an extensive commerce, becoming in the thirteenth century one of the great depots of the Hansatic League.

Returning to Kiev we find Vladimir II., surnamed Monomachos, reigning as grand-duke from 1113 to 1155. He was recognized as czar by the Greek emperor Alexios Komnēnos, and was the first prince whose brow was adorned with the imperial crown of Russia. George Sevoloditz, who is said to have founded Moscow, succeeded his father, but after his death in battle nearly the whole of Russia fell into the hands of the Mongols (1223-37), who, led by Batu Khan, destroyed Riazan, Moscow, and other towns. They were unable, however, to pierce through the forests to Novgorod, and, turning to the south-west, swept with fire and sword over the south-western provinces, defeated the Poles and the Hungarians, and finally established themselves on the Volga, taking the famous title of the Golden Horde (1242). These barbarians demanded and received tribute from the Russian clans, and for many generations their successors levied taxes over all Russia, exercising a fatally deteriorating influence on the Russian character, checking social progress, arresting the development of commerce, and retarding the growth of civilization, so that Russia fell behind the rest of Europe to an extent which the efforts of its modern rulers have been wholly unable to retrieve. New enemies meanwhile appeared on the western borders—the Livonians, the Teutonic knights, and the Swedes. Volhynia was annexed to the grand-duchy of Lithuania, which gradually increased in power, embraced within itself White Russia, Podolia, and the Ukraine, and in 1569 was joined to the then powerful kingdom of Poland. The Livonians, early in the thirteenth century, seized upon Livonia, Courland, Esthonia, and portions of Novgorod and Pskov; while the Swedes conquered Finland, and penetrated to the banks of the Neva. They were repulsed, however, in 1261, in a great battle on that river by the grand duke of Kiev, Alexander (afterwards canonized), who was named Nevski, in commemoration of his exploit. His youngest son,

Daniel, succeeded him in 1247, but removing the seat of his rule to Moscow, assumed, in 1296, the title of Grand-duke of Moscow. To this prince is ascribed the foundation of the Kremlin, about the year 1300.

Russian annals remain a labyrinth of confusion until the celebrated Ivan I., in 1328, educed order from chaos, raised Moscow to an indisputable pre-eminence, and made it the centre of the national religion, legislation, and polity. To him must be ascribed the foundation of the modern empire of Russia, and from his time the course of Russian history flows without serious obstruction. His son and successor, Simeon the Proud (1340-53), imitated his father's example, and his legacies of wisdom and prudence were respected by the council of regency which governed Russia during the reign of the incapable Ivan II. (1353-59). Dimitri (1359-89) subdued Tver and Riazan, and rising indignant against the long-continued supremacy of the Mongols, defeated the Khan Mamai in a great battle on the banks of the Don. Hence his favourite surname of Donskoi. His efforts, however, were only valuable so far as they nourished a longing for independence in the hearts of his people, for the Mongol power was not yet broken, and an immense Tartar army besieging Moscow captured the holy city, and reduced it to ashes (1383). In the reign of Vassili I. (1389-1420) Russia was invaded by the renowned Timur or Tamerlane (1395), by the Tartars under Edigei, and also by the fierce Livonians. But Vassili earned his subjects triumphantly through this ordeal of fire, and increased his dominions by the annexation or conquest of Nijni-Novgorod, Rostov, and Murom. Passing over the troubled reign of Vassili II. or the Blind (1426-62), we arrive at another great epoch in Russian history, the accession of Ivan III., justly surnamed the Great, who reigned from 1462 to 1505, and by the exercise of high political wisdom, as well as by the display of a brilliant military capacity, succeeded in sweeping away the numerous minor states which had so long crippled the energies and exhausted the resources of Russia. Novgorod was added to his dominions in 1478. His next great achievement was the liberation of the monarchy from the Tartar yoke. Allying himself with Mengli-Gereai, the khan of the Crimean Horde, he completely defeated Armet, the khan of the Golden Horde; and having thus consolidated his dominions assumed the title of Czar of all the Russias. He married Sophia, a niece of Constantine Palaiologos, in 1472, and introduced the arts of civilization by the employment of Greek engineers, architects, and artificers. He adorned Moscow with sumptuous edifices, codified the laws under the title of the *Soudebnik*, and graced his court with all the splendour of the Byzantines. The great ball of the Golden Horde, emblem of Tartar freedom, was carried to Moscow and set up as a memorial. The title Tsar, which we corrupted into *czar*, is a Russian translation of the Oriental dignity of *khan*. In the ninth-century Slavonian Bible David and Saul are called tsars; and the same title is then used to express the Byzantine emperors. He was succeeded, in 1505, by Vassili III., who captured Smolensk from the Lithuanians.

In 1533 Ivan IV., surnamed the *Terrible*, assumed the crown. His reign at first was brilliantly successful, though it followed a youth as wild as that of our own Henry V. He introduced printing, established a permanent military force, the *Streltzi* (or *Strichtz*); received at his court the English commercial envoy, Richard Chanceller (1554); patronized artists and men of letters; nursed the rising commerce of Russia; and conquered Kazan (1552) and Astrakhan (1554). He also drove the Livonian knights out of Livonia, and administered a severe check to the predatory Tartars of the Crimea. But after the death of his wife, Anastasia Romanov, an able and beautiful woman to whom he was passionately attached, his reason seems to have been shaken. He suddenly changed into a cruel

and despotic tyrant. His ablest counsellors were doomed to the scaffold, and a mad lust of blood glutted itself by the deaths of thousands in Tver, Novgorod, and Moscow. Even his eldest son fell a victim to his fury. His arms abroad now met with severe reverses; Livonia was wrested from him by Stephen Bathory, king of Poland, in 1583, and Moscow was stormed and burned by the Crimean Tartars. In this reign Siberia was discovered, and added to the Russian Empire.

Ivan was succeeded by his son Feodor in 1584, who wisely intrusted the government to his able and energetic brother-in-law, Boris Godunov, who erected numerous towns and fortresses, extended the Russian power over Siberia, and asserted the independence of the Greek Church in Russia of the Constantinopolitan patriarch. Feodor was the last prince of the house of Rurik, which had ruled Russia for 700 years. After his death in 1598 a period of civil war succeeded. The death of Dimitri, brother of Feodor, in 1591, had been attended by several mysterious circumstances, of which half a dozen pretenders took advantage. During the brief usurpation of a pseudo-Dimitri, Sigismund, king of Poland, invaded Russia (1610), captured Moscow, and proclaimed his son Vladislav czar; but inflamed by the patriotic appeals of the clergy, and led by the heroic Prince Pozharsky, the Russians rose against the Polish invaders, expelled them from the empire, and unanimously bestowed the Russian crown on Michael Feodorovich Romanov (1613-45), who was descended, on the female side, from the royal house of Rurik.

The new czar, the first of the Romanovs who still rule Russia, directed his efforts to heal the wounds which had been inflicted by civil war, and to check the incursions of enemies who had been encouraged by the partial paralysis of the Russian power. He concluded treaties of peace with Sweden and Poland, reformed the courts of law and justice, and remodelled the internal organization of the empire. Alexis (1645-70), who has been called the "father of his country," succeeded him. He re-introduced a silver currency, promoted internal trade, conquered Little Russia (hitherto in the power of the Cossacks), and defeated Poland and Turkey in several campaigns. He encouraged intercourse with foreign princes, and sent ambassadors, for the first time, to the courts of France and Spain. His minority had been chequered by much internal trouble, but the latter years of his reign were marked by prosperity and peace. He was succeeded by his son Feodor (1676-82), who, after a pacific reign of scarcely seven years, nominated his half-brother Peter as his successor, to the exclusion of his elder brother Ivan, who was disqualified by mental weakness for the government of a powerful people. Their sister Sophia, however, a restless and ambitious woman, contrived to seize the reins of power as premier regent. She was compelled to retire into a convent, and Peter and Ivan reigned as joint-czars until the death of the latter in 1689.

The reign of PETER THE GREAT is, in many respects, the most glorious period of Russian history, while it is undoubtedly a remarkable illustration of what may be effected by a shrewd intellect and a powerful will. He established the maritime power of Russia, which had previously possessed neither a royal navy nor a commercial marine. By connecting the rivers Volga, Don, and Dwina by canals, he opened up a water communication between the Baltic and the Black and Caspian Seas, thus diverting a great portion of the trade between Europe and Asia into Russian channels. By founding the city of ST. PETERSBURG (1703) on the Neva, he brought the Russian metropolis into closer communication with the principal European capitals. By a series of laborious campaigns, in which, at first, he suffered many defeats, he accustomed his army to war, and trained it in the European fashion. By the victory of *POLTAVA* (8th July, 1709), he checked the

conquering career of Charles XII., and so crippled the power of Sweden that thenceforth it could no longer make head against the schemes of Russian aggression. Travelling through various European states he made himself acquainted with the progress of modern civilization. At Amsterdam, and afterwards at Deptford, he learned ship-building, contentedly labouring with hammer and chisel like a common artisan. What he learned he taught his subjects, and soon had the satisfaction of seeing Russian ships on the Baltic, the Black Sea, and the ocean. He encouraged letters, trade, commerce, and all the useful arts and sciences; introduced foreigners into positions of trust, where they might assist him in moulding the infant empire; founded printing-presses, libraries, schools, colleges; organized a firm and far-reaching internal administration; and, in a word, developed the rude and degraded Slav-Mongol into the half-civilized, patient, and persevering Russian.

The career of Philip of Macedon resembles nearly that of the great Muscovite tsar; but there is this important difference, that Philip had, while young, received in southern Greece the best education in all matters of peace and war that the ablest philosophers and generals of the age could bestow. Peter was brought up among barbarians, and in barbaric ignorance. He strove to remedy this, when a grown man, by leaving all the temptations which his court offered, and by seeking instruction abroad. He laboured with his own hands as a common artisan in Holland and England, that he might return and teach his subjects how ships, commerce, and civilization could be acquired. There is a degree of heroism here superior to anything that we know of in the Macedonian king. In justice, however, to the ancient hero, it ought to be added that we find in the history of Philip no examples of that savage cruelty which deforms so grievously the character of Peter the Great.

Lamented by all his subjects Peter died in 1725, and was succeeded by his wife, who had zealously co-operated with him in his grandest designs, the Empress CATHERINE I. She reigned but two years. The son of the unfortunate Alexis (the eldest son of Peter, whom his father had put to death in a frenzy of jealous suspicion) then came to the throne under the name and title of Peter II. (1727-30), but the sovereign power really rested in the hands of his favourite, Prince Menzikov. He died, however, at the early age of fifteen, when the state-council conferred the imperial crown on Anne, duchess of Courland, niece of Peter the Great and daughter of Ivan. Her reign was distinguished by no great event or marked improvement in the condition of the people. She filled her court with favourites, such as the notoriously cruel Biren, duke of Courland, and, in loading them with undeserved favours, neglected the true interests of her empire. Ivan VI., a grand-nephew of the late czarina, reigned but a few months (1740-41), and was dethroned by the Empress Elizabeth (1741-62), the daughter of Peter the Great, whose sceptre she proved herself not unworthy to wield. She banished the detested Biren, secured Finland, and assisted Austria in the SEVEN YEARS' WAR, and but for her death might have given a very different termination to that momentous struggle. Her nephew and successor, Peter III. (1762), withdrew from all interference with European quarrels, and seemed bent upon a policy of internal reform and pacific progress, when he was dethroned by his unscrupulous consort, Sophia Augusta of Anhalt-Zerbst, better known by the name she received at her baptism into the Greek Church, as the Empress CATHERINE II. (1762-96). Her vices were so conspicuous by their openness and excess that she has been termed the Messalina of the North, and this side of her character has been vigorously painted by Byron in his "Don Juan." She was, however, a woman of extraordinary capacity and irresistible energy, and the material resources of the empire were greatly augmented by her successful policy. She fostered

the growing commerce of Russia by wise provisions, encouraged the arts and sciences, reformed and ameliorated the laws,* and divided the country into distinct governments, each of which had its separate administration in all matters of justice, social economy, and local policy. Her arms abroad were crowned with continual success. Her able general, Suvarov (or Suwarow), subdued Poland, and drove the Turks beyond the Dniester. In her new province of the Crimea she founded the great military port of Sebastopol. By the third partition of POLAND in 1795 she extended her power westward as far as the Vistula. She forced Sweden to sue for peace. Thus, when she closed her career, on the 17th November, 1796, she bequeathed to her son and successor, Paul I. (1796-1801), an empire which extended from the shores of the Baltic to Behring Strait.

Paul I. began his reign by an act of justice: he liberated the Polish hero Kosciusko. In 1799 he joined the European confederacy against revolutionary France, and despatched the veteran Suvarov with a large army to the assistance of the allies in Italy. At first Suvarov met with his wonted success, but eventually his good fortune deserted him, or he met with more formidable opponents. Disaster followed close upon disaster, and it was with difficulty that he saved the remnant of his forces by a skilful retreat from the victorious armies of Masséna and Moreau. These reverses had a singular effect upon the wayward mind of Paul, who, from being a bitter opponent of Napoleon Bonaparte, suddenly became his most fervent admirer and enthusiastic ally. He was preparing to co-operate in the ambitious projects of the French conqueror when his nobles, disgusted by his cruelties and by the freaks of his insanity, formed a conspiracy against him, and strangled him in his private apartments on 23rd March, 1801. It is generally believed that his sons were cognizant of the plot, and connived at it, from a well-founded apprehension that they might fall victims to his jealous cruelty.

Alexander I. (1801-25), on succeeding to the throne, held himself aloof from the great war that raged over all Europe, but alarmed at the preponderant military power of France, and disgusted by the murder of the Duc d'Enghien, he joined the European coalition in April, 1805. His army, with that of Austria, was defeated by Napoleon on the memorable field of Austerlitz on 2nd December, 1805, and both at the bloody battle of Eylau, on 8th February, 1807, and at that of Friedland, on 6th June, the Russian forces experienced terrible losses. Alexander now accepted the overtures which had previously been pressed upon him by the French emperor, and after an interview between them, held on a raft moored about midway in the river Niemen, peace was concluded by the treaty of Tilsit on 8th July, 1807. A second interview took place at Erfarth early in 1808, which apparently cemented the new alliance, and converted Russia into an enemy of Great Britain. Alexander, however, bided his time. The French emperor was soon sensible that he could expect but little real assistance from him, and addressed warm remonstrances to the Russian court, which met with polite evasion and lukewarm courtesy. The coldness between the two emperors daily increased; and at length Napoleon resolved on an invasion of Russia (June, 1812). Alexander made vast preparations to meet him, but aware of his inferiority in the open field, resolved on gradually retreating before the French. As Napoleon advanced, the Russians, under Kutusov, retired, burning every town they passed through, and carrying off all provisions and forage. After the sanguinary battle of Borodino on 7th September, 1812, where victory cost the French more than defeat entailed upon the Russians, Napoleon entered Moscow; not, however, as he had hoped, to receive ambassadors from Alexander in quest of peace, but to find the city almost deserted by its inhabitants. Scarcely had the French

soldiers entered within its gates than vivid columns of flame and dense clouds of smoke, rising simultaneously from various quarters of the capital, showed that its citizens had set it on fire. The French were only partially successful in checking the devouring course of the conflagration, and found themselves encamped amidst a waste of smoking ruins, pressed hard by cold and famine, thinned by battle and disease, and separated by hundreds of miles of ice and snow from their base of operations. There was nothing for it but to retreat with the utmost speed. On the 19th of October they evacuated Moscow and commenced a retrograde march, whose horrors have never been paralleled in the history of war. Hundreds perished in the snow; hundreds died of hunger and exhaustion. The once splendid host of Napoleon melted away into a scanty and disorganized band of gaunt, miserable, famine-stricken wretches. It is estimated that not 50,000 soldiers out of the 500,000 who had formed so superb an army on the banks of the Niemen ever returned to France. At the same time Wellington and the British, after driving the French armies before them, hovered on the frontiers of Spain. The knell of the French Empire had rung. Prussia and Austria sent forth their armies to join the victorious cohorts of Russia, and though Napoleon made incredible efforts to hold his ground against this coalition, he was forced to retire before the overwhelming strength of the allies. At Leipzig, from 16th to 18th October, 1813, his army was almost annihilated. Early in the following January the Emperor Alexander, at the head of the allied forces, crossed the French frontier, and in March entered Paris. Napoleon abdicated, and retired to the island of Elba. In the great events of the Hundred Days, and in the victory of Waterloo, 15th June, 1815, the Russians had no part, having previously retired. The remainder of Alexander's reign was devoted to the consolidation of his empire and to internal improvements. He effected great reforms; but he did not sufficiently recognize the growth of a new and more liberal spirit among the higher classes, nor make provision for its contentment. As long as Alexander lived they remained quiet, but when, on his death in 1825, he was succeeded by his younger son, Nicholas I., whose ability they respected, but whose despotic character they dreaded, they broke out into open insurrection. By the energy and courage of the new czar, however, it was speedily checked, and he entered upon that warlike and oppressive career which was suddenly checked by the Crimean War. He wrested provinces from Persia and Turkey, seized the protectorate of the Danubian Principalities, claimed the free navigation of the Black Sea, the Dardanelles, and the Danube, converted Poland into a Russian province, assisted Austria in stifling the Magyar insurrection, waged a relentless war against the Caucasian mountaineers, and pushed forward the frontiers of the empire towards Central Asia. His aggressions upon Turkey at length roused Great Britain and France to action, and provoked the Crimean War. His armies were defeated at the battles of Alma, Balaklava, and Inkermann, and broken by these unexpected reverses, his haughty spirit suddenly gave way. He died on the 2nd of March, 1855. SEBASTOPOL, the great southern arsenal and naval depot of Russia, was captured by the allies on the 9th of July in the same year.

Alexander II., who had succeeded his father, Nicholas, on the throne, soon afterwards concluded peace with Great Britain and France, and addressed himself to the task of internal organization. He accomplished many important reforms, but none more important or more valuable than the emancipation of the serfs (March, 1863). An insurrection in Poland, in 1863-64, was crushed after a severe struggle, and by a subsequent edict that unfortunate country was declared an autonomic part of the Russian Empire. The Caucasian War was brought to a satisfactory

conclusion, and Russia probably never enjoyed greater prosperity than at this time. In the Franco-German War of 1870 Russia took no part, but the sympathies of her rulers were undoubtedly German, and they would probably have been manifested in an active form had any power assisted France. In November, 1870, Prince Gortschakov issued a circular repudiating those clauses of the Treaty of 1856 securing the neutralization of the Black Sea, and at one time there was great danger of a war between Britain and Russia on the subject; but the matter was settled amicably at a conference held in London in 1871, at which Russia obtained to a great extent what she wished. In 1874 the Duke of Edinburgh, second son of Queen Victoria, was married to the Grand-duchess Marie, only daughter of the czar; and the same year Alexander visited England.

In the meantime events were transpiring in Turkey which were destined to lead to another conflict between Russia and that country. In 1874 a long-smouldering insurrection broke out in Bosnia and the Herzegovina, the apparent inability of Turkey to suppress which drew forth, early in 1876, the "Andrassy Note," by which the Powers indicated the reforms they considered necessary to conciliate the insurgent provinces. The insurrection, however, continued, and Serbia seemed disposed to take part in the struggle. In May, 1876, the murder of the French and German Consuls at Salonica caused Germany, Austria, and Russia to unite in proposing to send to Turkey the "Berlin Memorandum," which was a threat of active intervention if steps were not at once taken by the Sultan to grant an amnesty to the insurgents, and to carry out certain reforms under the supervision of a delegation of consuls. England declining to join in the memorandum, it fell through, and Serbia, alleging that this failure made all hope of a peaceful settlement impossible, declared war, in conjunction with Montenegro, at the beginning of July. A feeling of extreme indignation against Turkey had now arisen, on account of the cruel massacres of thousands of Bulgarian men, women, and children in May, on pretence of suppressing an alleged intended insurrection. Fired with this feeling against the Moslem butcheries, large numbers of Russians poured into Serbia to assist in the struggle there against the suzerain power. The Turks, however, were victorious, and in November would probably have overrun the principality, but for an ultimatum from Russia demanding an amnesty. This was granted, and soon afterwards Russia and Austria announced their acceptance of the plan proposed by Lord Derby for holding a conference for the settlement of questions in Turkey involving the peace of Europe. The conference met in Constantinople towards the end of 1876, and continued its efforts till the 20th January, 1877, when it was dissolved, and, to mark their dissatisfaction at the insincere course pursued by Turkey, the several Powers withdrew their ambassadors from Constantinople. The Turks refused an ultimatum swiftly issued by Prince Gortschakov in the name of Russia, and on the 24th April, 1877, the emperor declared war, and at once directed his armies to cross the frontier both in Europe and Asia.

In Asia the Russians were victorious for a time, and by the 22nd May Kurs was invested; but in Europe it was the 30th June before the Danube was crossed by the main body of the Russian army. General Gouko made a raid through the Balkans and seized the Shipka Pass at its southern end, which he held against desperate assaults of the Turks. In the meantime Osman Pasha moved up from Widin, and, gathering up strong forces on his way, threw them into the open town of Plevna, from which, on the 18th July, he repulsed the Russians, who had blundered into the town in ignorance of the presence of the Turks. Osman Pasha at once commenced fortifying the place, and, aided by the immense natural facilities for defence which the position afforded, he soon turned the

open town into an impregnable fortress. The Russians proved this to their serious cost on the 30th July, when a renewed endeavour to take the place by assault was repulsed with great slaughter. So disastrous was their defeat, indeed, that they were glad to accept the offers of Prince Frederick Charles of Roumania to join them in the war, and a strong force of Roumanian troops was hurried up to the aid of the sorely-pressed Muscovites around Plevna. The Russian Imperial Guard and a host of other new troops were now brought up, and a process of strict investment of Plevna was commenced. His supplies thus cut off, Osman Pasha held his enemies at bay until the 10th December, when, after a heroic but ineffectual attempt to break away, he surrendered with his whole army. The formidable host of Russians, now released from Plevna, swarmed by several passes through the Balkans, took in succession Sophia, Philippopolis, and Adrianople, and commenced an advance in force towards Constantinople. So imminent was the peril that British troops were sent to Gallipoli, and the fleet was held in readiness to save the sultan's capital. In Asia the Russians, greatly reinforced, had again advanced, utterly defeated Mukhtar Pasha, taken Kars, and now menaced Erzeroun. Seeing the utter collapse of their armies and their capital endangered, the Turks sued for peace, and after considerable delay the treaty of San Stefano was signed on 3rd March, 1878. By this the Turks ceded to Russia about 9000 square miles in Asia, including Ardahan, Kars, and Batoun, agreed to pay an indemnity, to recognize the independence of Roumania, Servia, and Montenegro, and to the establishment of very large semi-independent states of North and South Bulgaria. Great Britain, however, and other Powers, as signatories of the Treaty of Paris, asserted their right to a voice in the new arrangement of Turkish territory; and by the Congress of Berlin, in July, 1878, the San Stefano Treaty was considerably modified. Russia obtained from Roumania the strip of Bessarabia taken from her in 1855—her whole gain of territory in Europe. Only one part of Bulgaria received autonomy, the other, as Eastern Roumelia, being restored to the sultan. Freed from European necessities Russia now turned with fresh vigour to her policy of aggression in Central Asia. In 1872 General Kaufmann, in continuing previous raids by General Tcherniaiev, found himself at last able to occupy the capital of the Khan of Khiva, and although a peace with that prince replaced him on the throne, it was under a strict Russian protectorship. In 1875 the neighbouring Khan of Khokand was reduced to the same dependent condition. In the same year an insurrection gave General Skobelev the opportunity to formally conquer the khanate, and it became a part of Russia in March, 1876. This conquest was immediately followed by that of the Kara Khingiz tribes. Then the European war tied Russia's hands for a time. In 1879 she recommenced, this time attacking the Turkoman Tekkes, but with not great success. General Skobelev was sent again to lead the advance, with the result that in May, 1881, the Tekkes were subjected by being half-extermiated.

A grave calamity now overtook Russia. Much of her undoubted advance in civilization was due to Alexander II. the liberator of the serfs; and, indeed, it was not so much in a personally hostile spirit as in undying hostility to the imperial principle that the widespread revolutionary conspiracies, embraced under the head of **NIHILISM**, continually sought to kill him. By making the office of czar a deadly one, they sought, as they explain, to frighten any successor of Alexander II. into reforms long denied. Many attempts failed; that of the 14th April, 1879, came very near success, when a large part of the great palace was wrecked; and that of the following December still nearer, when the railway over which the czar's train should have been passing was blown up by a mine. Finally, on 13th

March, 1881, the unfortunate monarch was killed by an explosive bomb thrown at him as he passed along the streets. The action, if it had any result, worked against the Nihilists, and the new czar, Alexander III., though too much alarmed to show himself often in public—for instance, waiting more than a year before being crowned—adopted firm and severe measures without pause, and was supported very generally, even by many who would otherwise have sympathized with efforts at reform.

Alexander III. continued the Asian policy of his father's reign. In 1884 Merv was formally annexed to Russia, and the advance crept on until in March, 1885, Penjdeh, a village on the borders of Afghanistan, was occupied. This brought Russia face to face with England, as the protector of the Amir of Afghanistan. Penjdeh was claimed by the latter, and it was necessary at once to come to a strict understanding as to the Russo-Afghan frontier, which in the long ages during which the half-settled nations of Central Asia had been the nearest neighbours of Afghanistan had been left very vaguely defined. A commission had already been investigating the matter, and relations became very strained through the seizure of Penjdeh. Diplomacy was successful in averting a rupture, however, and the commission, reconstituted, continued its labours. At last, by the year 1887, it was able to withdraw, the entire frontier having been marked out to the satisfaction of all three powers.

In September, 1885, a revolution broke out in Eastern Roumelia, which resulted in its junction with Bulgaria, then under the energetic rule of Prince Alexander (of Battenberg). This revolution, carried out entirely without Russian aid, was very distasteful to Russia, who wished her influence in Bulgaria to be predominant. Accordingly, though Russia agreed to the peace between Servia, Bulgaria, and Turkey, in March, 1886, she favoured many attempts at conspiracy against the Prince of Bulgaria, and at last he was seized and banished to Russian territory in August. He returned and was triumphantly restored in a few weeks, but finding that his remaining on the Bulgarian throne would endanger the liberty of his adopted country, now that Russia had openly declared herself dissatisfied with his rule, he magnanimously withdrew from Bulgaria in September, 1886, although the circumstances had clearly shown his power and popularity among his people. Several unsuitable candidates for the vacant throne were proposed, and on the other hand applications made to some princes by the Bulgarians themselves were declined. This state of things continued until the summer of 1887, during which the country was ruled by a regency or Directory of three. In July, 1887, Prince Ferdinand of Saxe-Coburg was elected by the Sobranie to the vacant throne. Having accepted the offer he, on the 11th August, took the constitutional oath at Tirnova. He was not, however, recognized by the signatory powers to the treaty of Berlin, in consequence of the opposition of Russia.

RUSSIAN HORN-BAND, a curious variety of the musical art, being a small orchestra of horns and trumpets, in which each performer only sounds one single note. As in bell-ringing, therefore, a tune can be produced only by each man coming in with his note in its proper place; but on the other hand, as it is very easy to play one note, demanding no knowledge of music nor special skill in blowing or fingering, the most uneducated persons can be used as performers. This, indeed, was the origin of these bands, a Bohemian musician in the service of Prince Nariachkine, in 1751, having hit upon this brilliant idea, and turning the boorish half-embriated serfs into a means of producing delicate and refined music. The smallest bands have twenty horns, the largest about double that number. The effect is very sweet in quality, as the notes are all open notes, and therefore resonant and accurately in tune, characters which cannot belong to notes of the

fingering or stopped scale. No Russian horn-band has visited England since 1834; and it is evident that so costly a machinery for producing simple results must die out as the progress of culture enables the Russian peasantry to learn the ordinary musical methods.

RUST, in the common acceptance of the term, is the red pulverulent substance which is formed on the surface of iron when exposed to air and moisture. It is an oxide of iron.

RUST, in botany, is a disease of plants, which shows itself on the stems and leaves, and on the ears of cereal and many other grasses, in brown, yellow, or orange coloured spots, due to the presence of a certain state of small fungi, formerly placed in the genus *Uredo*. Under the heading *ÆCHIDIUM BERBERIDIS* there will be found a description of the life-history of the fungus of which rust is but a state.

RUSTSCHUK, a town of Bulgaria, situated at the confluence of the Cara Lom with the Danube. It is 40 miles from Nicopoli, and about the same distance from Bucharest. It has a castle of considerable strength, with several mosques, baths, and public buildings. The inhabitants, consisting of Turks, Armenians, Greeks, and Jews, amounted to 26,867 in 1881. They are chiefly employed in the manufacture of cotton, silk, linen, and woollen fabrics. The place was the scene of some sanguinary conflicts between the Turks and the Russians in 1811 and 1828, and suffered severely from bombardment in 1877.

RUTACEÆ, an order of plants belonging to the *PORPHYREAE*. They are shrubs or herbaceous plants; the leaves are generally opposite and compound. There are four or five sepals and an equal number of petals; the stamens are of the same number, or double that of the petals inserted generally at the base of the torus. The disc is situated between the stamens and the ovary. There are four or five carpels, generally connate in an ovary, with four or five cells; there are two ovules in each cell, pendulous, with ventral raphe.

Many of the plants of this order emit a powerful and usually offensive odour from the glands that cover their whole surface. These glands are sometimes so full of a volatile oil that in hot weather the atmosphere surrounding the plants becomes charged with it. The *Diosmas* or *Bucka* plants are used in medicine as anti-spasmodics. *ANGOSTURA BARK* is produced by a plant, *Galipea officinalis*, belonging to this order. *RUE* is a species of *Ruta*, a genus which gives its name to the order. *FRAXINELLA* belongs to the genus *Dicamnanus*. *CITRUS* is the genus which includes such well-known fruit as the orange and lemon. *EGG* and *ZANTHOXYLON* are other well-known genera. There are about 650 species, natives of temperate and warm regions of the whole world, but occurring mostly in South Africa and Australia.

RUTH, BOOK OF, a canonical book of the Old Testament, which, in the Septuagint and the Authorized Version, is placed between Judges and Samuel, but which in the Hebrew forms part of the Hagiographa. It is the second of the five *megillith*, or rolls, which are read by the Jews at the five feasts, coming after Canticles and being read at Pentecost. It is divided in the Authorized Version into four chapters, and it contains the history of Ruth, a woman of Moab who married a Hebrew named Mahlon in her own country, and who, after she had become a widow, followed her mother-in-law Naomi to the land of Israel, becoming afterwards the wife of Boaz and ancestress of David. The genealogy given at the end of the book, which is repeated in Matthew, and with one variation in Luke, appears to omit some of the links of the chain, only ten generations being counted between Judah and David, or a period of some 850 years. The author of the book is unknown, and the tradition preserved in the Talmud that it was written by Samuel is quite untenable. The genealogy being carried down to David

implies the significance he had acquired in Jewish history at the time it was written, and verse 7, chap. iv., indicates that it was not written until a considerable time after the events related.

The book presents a beautiful idyllic picture of the primitive domestic life of the Hebrews, and the narrative is one of the most charming of all those which have been preserved in the Old Testament. In connection with the manners and customs of the people depicted in it, a modern resident in Palestine observes, "The entire scene of Boaz and Ruth might be enacted at the present day by the dwellers in Bethlehem with but trifling omissions and variations," and he shows that in the salutations between proprietor and labourers, in the modes of reaping, gleanings, and threshing referred to, the food eaten, the sleep of the proprietor in the threshing-floor to prevent robbery, the use of the rail to carry loads, &c., there has been little if any change since the Moabitess came with her mother-in-law into the district of Bethlehem-Judah.

RUTHENIUM, one of the metals of the platinum group, was discovered by Claus in 1846. It is found in the platinum ores, especially in osmiridium; is a white brittle metal, obtained usually by calcining the ammoniacal chloride; and is the most infusible metal known, with the exception of osmium. It can only be melted by the oxy-hydrogen furnace. The specific gravity of the fused metal is 11.4. It is very slightly attacked by nitro-hydrochloric acid, but is easily oxidized by fusion with potassium hydrate, which converts it into ruthenate of potassium, soluble in water. The symbol is Ru, the atomic weight 101. It forms a crystalline alloy with zinc, and a beautifully crystalline alloy with tin ($RuSn_2$), which crystallizes in brilliant cubes, resembling bismuth. It forms five oxides, the protoxide (RuO), the sesquioxide or ruthenous oxide (Ru_2O_3), the dioxide or ruthenic oxide (RuO_2), the trioxide or ruthenic acid (RuO_3), and the tetroxide (RuO_4). The protoxide is a dark gray powder, not acted on by acids; the sesquioxide is a black powder, soluble in acids, forming yellow solutions; the dioxide is a dark blue powder, which forms a hydrate ($RuO_2 \cdot 2H_2O$), soluble in acids and in alkalies, ruthenic acid is only known in combination as a potassium salt; the tetroxide is a golden yellow crystalline body, melting at $58^\circ C.$ (136° Fahr.), boiling at $100^\circ C.$ (212° Fahr.), and very soluble. It is soluble in hydrochloric acid; the solution becomes purple on addition of sulphurous acid.

There are three chlorides of ruthenium--the dichloride ($RuCl_2$) is a black crystalline powder, insoluble in acids; the trichloride or ruthenous chloride ($RuCl_3$) is a brown deliquescent crystal, becoming green and then blue on heating. It is soluble in water. The tetrachloride or ruthenic chloride ($RuCl_4$) is known only in combination as a double potassium salt ($2KClRuCl_4$), which is a brown crystal with rose iridescence, and soluble in water, but not in alcohol. The ammonium double salt ($2NH_4ClRuCl_4$) resembles the potassium salt. There are a large series of compound ammonium salts containing ruthenium. Ruthenium salts are distinguished from those of the other platinum metals by the formation of soluble potassium ruthenate when fused with nitre; the solution, which is orange yellow, yields a black precipitate with nitric acid, which redissolves when treated with hydrochloric acid, and this orange-coloured solution yields a black precipitate with sulphuretted hydrogen, the filtrate from which is a fine sky-blue colour and characteristic.

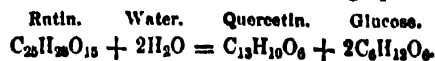
RUTHERGLEN, a royal burgh of Scotland, in the county of Lanark, $2\frac{1}{2}$ miles south-east from the Cross of Glasgow. The burgh was chartered by David I. in 1126, and is governed by a provost, two bailies, and thirteen councillors. Rutherglen, or "Ruglen," as it is popularly called, is now little more than a suburb of Glasgow, on the south bank of the Clyde. The town possesses few

buildings of any importance; the chief is the modern town hall. There are a parish church, with a tower belonging to the ancient parish church, which was the scene of some interesting historical events, two other Established churches, two Free churches, a U.P. church, a Roman Catholic church, a Congregational church, and some Wesleyan and other places of worship. It has extensive print and dye works, collieries, and a paper manufactory. It is very ancient, and was formerly a very important place, Glasgow having been included within its municipal boundaries in the twelfth century; at present it consists chiefly of one wide street, from which numerous narrow lanes branch out. The population of the parish in 1881 was 13,801; of the town, 11,265.

RUTHIN, a town of Wales, in the county of and 8 miles S.S.E. from Denbigh, on the railway to Corwen, and 227 miles from London by the North-western Railway. It is on the summit and slope of a hill, at the foot of which flows the Clwyd, and is thus situated in the midst of very pleasant scenery. The town appears to have taken rise from the foundation of the castle, which was built by Roger Grey, to whom Edward I. granted the whole of the vale of Clwyd. This castle got the name of Rhyddin, or the Red Fortress, from the colour of the stone of which it was built. It stood, not on the summit, but on the western slope of the hill, towards the Clwyd. The castle has been destroyed, and a new edifice, which from its style may be considered as a restoration of the ancient castle, has been erected on the site. The summit of the hill is occupied by the market-place, to which the principal streets lead. The county-hall or court-house is the finest building for the purpose in North Wales. The county prison is well built. There is a very fine corn exchange and market hall. The church is the choir of a more spacious conventual building, which was suppressed in 1310, and afterwards rendered collegiate. There are vestiges of the walls of the nave and a transept. The roof of the present church is admired for its curious workmanship. The grammar-school has six exhibitions to the universities. There is an almshouse for twelve decayed housekeepers, ten men and two women, which is called Christ's Hospital. Ruthin is a municipal borough, and is governed by four aldermen (of whom one is mayor) and twelve councillors. The population in 1881 was 3034.

RUTILE is a naturally-occurring oxide of titanium (TiO_2), of a brownish-red colour, and with a slightly metallic lustre. It is found as imbedded crystals in various crystalline rocks and quartz, and assumes a characteristic needle-shaped form in the latter. The mineral is used in the arts to produce a yellow colour in the painting of porcelain, and also to impart a faint yellowish tint to artificial teeth.

RUTIN or **RUTINIC ACID**, a glucoside which is widely diffused in the vegetable kingdom. It was first obtained from rue (*Ruta graveolens*, natural order Rutaceæ), but is also found in capers, in the flowers of *Sophora japonica*, in safflower yellow, and in other plants. It crystallizes in yellow needles, having the formula $2\text{C}_{25}\text{H}_{26}\text{O}_{13}\text{N}_2$, which on heating give off water and leave anhydrous rutin ($\text{C}_{25}\text{H}_{26}\text{O}_{13}$). Rutin is insoluble in cold water and in ether, but soluble in boiling water and alcohol. It is soluble in hot acetic acid and in alkalies, alkaline carbonates, and in lime and baryta water. It is coloured dark green by ferric chloride, and melts at 180°C . (350°Fahr .) to a yellow viscid liquid, which crystallizes on cooling. When boiled with dilute mineral acids, it splits up into glucose and quercetin according to the following equation:—



The glucose thus obtained is called rutin sugar; it has no action on polarized light, and is not fermentable.

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RUTLAND, a small county of England, is bounded N. and N.E. by Lincolnshire, S.E. and S. by Northamptonshire, and W. by Leicestershire. It is of compact form; the greatest length N.E. to S.W. is 19 miles; the greatest breadth at right angles to the length is 14 miles. The area is 94,899 statute acres. The population in 1881 was 21,434.

Surface, Geology, and Rivers.—The north-eastern part of the county is a somewhat elevated plain or table-land, skirted on the southern side by the valley of the Wash, which opens on the west into the more expanded vale of Chatmoss. The remainder of its area consists of valleys whose general direction is east and west, divided from each other by narrow ranges of low hills.

Rutland is included in the district occupied by the lower formations of the Oolitic series. The great Oolite forms the north-eastern table-land above mentioned, and occupies also the higher ground in the eastern districts: the prevailing rock is a close-grained limestone. The remainder of the shire is occupied by the red or reddish-brown ferruginous sands which separate the great Oolite from the subjacent Lias. These are covered in many places, especially near their junction with the Lias, which takes place just on the north-western border, by vast accumulations of transported blocks of gravel. There are quarries of good building stone at Ketton, between Stamford and Uppingham.

Rutland belongs chiefly to the basin of the Wash. The Welland, one of the rivers which flows into that estuary, skirts it on the south-east side. This river is not navigable above Stamford, where it quits the county altogether. The river Guash, or Wash, rises just within the border of Leicestershire, and runs east through Rutland into Lincolnshire, where it joins the Welland just below Stamford. The Chater also rises in Leicestershire, and flows parallel to the Wash: it joins the Welland just above Stamford. The Eye Brook bounds the county on the south-west, and unites with the Welland below Rockingham. The Wreak, which augments the Soar, a feeder of the Trent, rises in Rutland near Oakham, and flows north through the vale of Chatmoss into Leicestershire. The Leicester and Peterborough Railway passes by Oakham.

Rutland is one of the grazing counties of England in which much attention has been paid to rearing choice animals, both oxen and sheep. It includes many wealthy proprietors, who more or less encourage agriculture in all its branches. The soil is mostly of a good quality; the face of the country is agreeably diversified, affording good sites for country seats, parks, and pleasure grounds; and the richness of some of the natural pastures has no doubt made it, from an early date, the residence of the richer clergy and gentry. The best pastures are on the Lias clay. They are very similar to those of Northamptonshire. The low meadows along the rivers Welland, Wash, and Chater, are subject to inundations. The dairy occupies an important place in the system of farming, much cheese of a fine quality, and particularly that known as Stilton, being made.

The arable land was formerly but indifferently cultivated, as was the case generally in those districts where grazing was the principal object of the farmer; but by the inclosure of common fields and the extended cultivation of turnips, a much greater quantity of corn is produced than would at one time have been thought possible; and by means of under-draining and an improved husbandry, the land capable of producing good crops of turnips is daily increasing.

Rutland is divided into five hundreds. It is in the diocese of Peterborough, and in the Midland Circuit, the assizes being held at Oakham. It formerly returned two members to the House of Commons, but was deprived of one by the Redistribution of Seats Act of 1885.

History and Antiquities.—Rutlandshire appears to have been included in the country of the Coritani; and upon

the Roman conquest of Britain, in the province of Flavia Caesariensis. Under the Saxons it formed a portion of the kingdom of Mercia. From them it appears to have derived its modern name (in Domesday "Roteland"), which was given first to a part only of the present county. Its antiquities are chiefly ecclesiastical.

RUTYLENE is a hydrocarbon polymeric with acetylene. It is a light colourless liquid of agreeable odour, having the formula $C_{10}H_{18}$, and boiling at 150° C. (302° Fahr.) It is soluble in alcohol and ether, but insoluble in water, and is obtained by the action of alcoholic potash on tribromide of anylene ($C_{10}H_7Br_3$).

RUYS DAEL, JAKOB VAN, born at Haarlem in 1625, was originally brought up to surgery, but eventually adopted painting as his profession. He probably received his first instruction in art from his uncle, Salomon van Ruysdael (1600-70), also a good landscape painter, and afterwards he was a student and friend of Berchem. Jakob's life was perfectly uneventful save for his art alone. He died at Haarlem in 1681.

Ruysdael was not merely an accurate imitator of nature. What makes his works so far superior to any other Dutch painter is a quality far higher than accuracy; indeed in that Hobbema is his equal, if not his superior. Ruysdael, however, stands alone in his school in the power of imagination, the ability to express sentiments to charm with the poetry of silence and solitude. But for him poetry and Dutch landscape would seem incompatible terms. Woods and waterfalls are the prevailing subjects of his landscapes. He never painted figures, these which are

represented by Ostade, Wouvermans, Van der Meer, or Berchem. There are fine specimens of his work in various parts of Europe. England is very rich in this favourite painter's works—there are more the pictures of his in the National Gallery alone.

RUYS TER, MICHAEL ADRIANSZON VAN, a famous Dutch naval hero, born at Flushing on 21st March, 1657, went to sea as a cabin-boy, and rose successively till in 1685 he was made a captain. He served for several years in the East Indies, and in 1645 was appointed rear-admiral. In 1647, off Saltee, he attacked and sunk an Algerine squadron. In 1652 he was employed in the war against England. In 1653 he commanded a division under Van Tromp, and was beaten by Blake, but afterwards obtained an advantage over the English near the Goodwin Sands. In 1659 he was sent to the Mediterranean to chastise the pirates of Algiers and Tunis. In 1659, when sent to the assistance of Denmark against Sweden, he defeated the Danish fleet, and the King of Denmark gave him a full sovereignty with a pension. He fought against Prince Rupert of England in 1665, with no decisive result, and at the beginning of the following year was beaten by the English. On June, 1667, he entered the Thames, sailed up the Medway, and destroyed some ships both at Chatham and Sheerness. Four years later he had the command of the Dutch fleet which was to oppose the French and the English, but the various engagements were without any important result. Towards the end of 1675 he was sent to the Mediterranean to support the Spanish interest against Louis XIV. of France, and fought a desperate battle with the French admiral Duquesne, off the eastern coast of Sicily, on 22nd April, 1676, in which his fleet was worsted, and Ruyster had both his legs shattered. He effected a retreat into the port of Syracuse, where he died of his wounds, 29th April. He was buried in the Nieuwe Kerk at Amsterdam, where, as at his birthplace, a monument was erected in his honour. See "The Great Dutch Admirals," by Jacob de Liefde (London, 1873).

RY DAL, a small and beautiful lake of Westmorland, between Ambleside and Grasmere, about one mile long by a quarter broad. Near its south-east margin is Rydal Mount, long the residence of the poet Wordsworth.

RYDE ("a fort"), a watering-place and municipal borough of England, on the north shore of the Isle of Wight, opposite Portsmouth, from which it is distant 6 miles S.S.W. It is built along the shore, and on the declivity of a well-wooded hill, which is covered with gardens and picturesque villas. Owing to its salubrious climate and beautiful position, it is now the largest and most fashionable town in the island. It has six churches, and several places of worship for Roman Catholics and dissenters, a town-hall, assembly rooms, museum, literary institute, and a handsome school of art, the foundation stone of which was laid by the Crown Princess of Germany during a visit to the Isle of Wight in 1871. There are two piers, one of which, 2200 feet long, affords an agreeable promenade. A good sea-wall protects from injury another pleasant promenade, called the Esplanade. The Royal Victoria Yacht Club has here its headquarters. A railway connects the town with Sandown, Shanklin, Ventnor, and Newport. The population in 1881 was 11,461.

RYE, a Cinque port, municipal borough, and seaport of England, in the Rye parliamentary division of East Sussex, 9 miles north-east from Hastings, and 72 from London by the South-eastern Railway, is situated at the eastern corner of the county, on the west bank of the Rother, which here falls into the sea by an estuary. The condition of Rye has mainly depended upon its harbour, which in the sixteenth century was nearly choked up; an Act was passed in 1518 for amending its condition, yet it was not till the storm of 1570 reopened it that it was navigable for trading vessels. The sea, however, continued to recede, and the bar of beach accumulated at the entrance, till, in 1750, all hopes of improving the old harbour being abandoned, it was determined to form a new mouth by a canal running directly south into the sea. This work was prosecuted at a great expense till 1778, when the new harbour was found to be a complete failure, and was abandoned. The old harbour, now 2 miles distant, was once more resorted to, and it has been much improved. It receives the three rivers Rother, Brede, and Tellingham. The average rise of spring tides is about 17 feet, and of neap tides from 9 to 12 feet at the pier-head, while the lit in the bay is 22 feet. At low water the harbour is dry. The depth of the channel up the river decreases gradually to the town, where there is 14 feet of water at spring tides, but during neaps seldom more than 9 feet. The approach from the bay to the entrance of the harbour is very intricate and difficult, especially for sailing vessels, owing to the sandbanks and the tortuous course of the channel. The chief trade consists in the export of hops, hulk, and wool, and in the import of coals, corn, timber, and Dutch produce. There are breweries, ironworks, chemical works, and shipbuilding yards, and a numerous and well-found fleet of fishing smacks. The fortnightly cattle market is one of the largest in the county. The town consists of three principal streets intersected by cross streets, all narrow, old-fashioned, and quaintly picturesque, and the houses are irregularly built. It contains a town-hall, parish church, chiefly of Norman date, three chapels, public library, and free grammar-school. The Ypres Tower, built in the reign of Stephen, and the Land Gate, are interesting memorials of antiquity. The municipal borough is governed by four aldermen and twelve councillors. The population in 1881 was 4220. Rye returned two members to the House of Commons from the 42 Edward III. down to the Reform Act of 1832, which deprived it of one of its members, and at the same time enlarged the electoral limits. In 1885 its representation was absorbed into that of the division of East Sussex.

RYE (*Secale cereale*) is a plant of the order Gramineæ [see GRASSES] and bears naked seeds on a flat ear furnished with awns like barley. The straw is solid, the internal part being filled with a pith, which makes it valu-

able for litter, and still more so for thatching. Its value is often nearly equal to, sometimes greater than, that of the grain. Rye grows on poor light soils which are altogether unfit for wheat. It was formerly raised in considerable quantities in England, either alone or mixed with wheat, and was then called *Meslin*, from the Old French word *meslé*, which means mixed. The meslin, when ground, produced a very wholesome and palatable household bread. It is extensively cultivated on the Continent, where it is the chief grain from which the spirit commonly called *Hollands* or *Geneva* is distilled.

In England, however, rye is at present raised in very small quantities, and is mostly sown as a green crop, and when fed off early in spring with sheep the land is invigorated, and will bear excellent potatoes or turnips the same year. This practice cannot be sufficiently recommended, and if the rye is sown very early in autumn it may be fed off in October and November, when sheep-feed is beginning to fail and the turnips have not yet attained their full size, without any detriment to the succeeding spring produce.

The preparation of the land for rye is the same as for wheat, except that in very light soils no more ploughings are required than will clear the ground of weeds. If rye is sown after harvest one ploughing only is usually given. It will thrive upon rich wheat soils, as well as upon lighter, and as it throws out numerous stems in rich land it is the more profitable as fodder, although the crop of grain might not be so abundant when the plants are too much crowded. The native country of rye is not known with any degree of certainty, but De Candolle considers that the region which has the best claim is that lying between the Alps and the Black Sea ("The Origin of Cultivated Plants, 1883"). The genus *Secale* belongs to the tribe *Hordeæ*, in which the spike is simple with its axis notched, and often jointed; the spikelets are sessile at each notch, one alone or several together; they have one or several flowers. The chief botanical difference between rye and wheat is that in the former the spikelets are only two-flowered, with the abortive rudiment of a third flower, while in wheat the spikelets have three to several perfect flowers; the lower paleæ of the flowers of rye are long-awned, and the grain is brown. According to the official agricultural returns published in 1886, there were 59,000 acres devoted to the cultivation of rye in the United Kingdom—44,000 in England, 7000 in Scotland, and 8000 in Ireland.

RYE-GRASS (*Lolium perenne*), sometimes called *Ray-grass*, is one of the most common of the artificial grasses. It belongs to the order Gramineæ. [See GRASSES.] There are several varieties, some annual and others perennial, some producing a strong juicy grass, and others a small diminutive plant. These varieties arise chiefly from difference of soil, climate, and cultivation. In the convertible system of husbandry rye-grass performs a very essential part, especially the perennial sort, which, mixed with different varieties of clover and other grass seeds, produces a rich and close herbage, which may be either mown for hay or depastured.

RYE-HOUSE PLOT, a plot of the year 1683 to murder King Charles II. and his brother James, duke of York, heir to the crown (afterwards James II.) on their way from

Newmarket Races, only foiled by the royal party starting a week earlier than arranged. The plot is named from the meeting-place of the conspirators, the Rye-house Farm, on the Lea, in Hertfordshire, not far from London, then belonging to Rumbold, one of the plotters, who was a maltster, and now a well-known pleasure resort. Rumbold was an old officer of the Parliamentary army, and his associates were mostly men of the same kind, angry at the loose life of the king, and jealous of the cautious way in which he was undermining the safeguards of English liberties. The plan was to overturn a cart, fire on the king and his brother in their coach, and then escape across the fields to rouse the country and restore the Commonwealth, the royal family being at an end. Some of the conspirators turned king's evidence, and the rest were executed. This plot had no connection with the contemporary conspiracy, much more formidable, of Lords Monmouth, Russell, Essex, and Algernon Sidney, which was also betrayed, when the first, with his usual pusillanimity, fled and begged for his life, and the others all perished. These men contemplated a revolution, not an assassination.

RY'OT, one of a class of tenants of land in India and the East generally, whose holding is like the western custom in Ireland, namely, not dissoluble while he pays the agreed rent. This is often in kind, as in the parable of the wicked husbandman (Matt. xxi., Mark xii., and Luke xx.), in all the versions of which it is told that the lord of the vineyard, who had let it to husbandmen, "at the season sent to the husbandmen a servant that he might receive of the fruits of the vineyard." The ryot-right is hereditary, but not always salable; and forfeiture is incurred by non-payment of the usufruct.

Ryotwar is the revenue settlement made by the British officials in Hindustan with each ryot for a given term, and at a stipulated yearly rent. This land system prevails chiefly in the Madras presidency.

RYSWICK, a small town of Holland, 2 miles south-east of The Hague, memorable as the place at which the treaty of 1697 was signed by France, England, and Spain; a pillar, 65 feet high, commemorates the event.

RYSWICK, PEACE OF, was concluded in 1697, and terminated the war which had begun in 1688 by France against Holland, England, Germany, and Spain, the parties to the League of Augsburg (1686) and the Grand Alliance (1689). Four treaties were upon this occasion signed in the royal palace of Ryswick. By the treaty with the United Provinces Louis XIV. agreed to restore all his conquests from that power, and the Dutch in like manner gave back to France their conquest of Pondicherry in the East Indies. By the treaty with Spain Louis restored Gerona, Rosas, and his other conquests in Catalonia, and also Luxembourg, Charlot, Mons, and all the other places in the Low Countries. By the treaty with England all conquests during the war were mutually restored; and Louis acknowledged William III. as lawful king of Great Britain. By the treaty with the Emperor, Louis restored Friburg, Philipsburg, and Brisac, and consented to the re-establishment of the Duke of Lorraine; and the Emperor ceded to France Strasburg and its dependencies. The general peace that followed the treaties of Ryswick lasted only till 1702.

S is the chief sibilant of the English alphabet, and is employed to represent two different sounds, as in *this* and *these*. The first is the *s* proper, and is the surd form of the sibilant class of spirants; the second is more accurately represented by *z*, and is the corresponding sonant to the true or surd *s*. The word *sugar* would seem to justify the addition of a third sound, *sh*, but in this word the vowel *u*, so often pronounced *yu*, has modified the pronunciation of the preceding consonant. *Syugar* would easily glide into *shugar*. In the Hebrew alphabet a common symbol is employed, with and without an affixed dot, to denote *s* and *sh*. *S* is closely allied to *r*: and even in the oldest English there are traces of the interchange, as *forlorn* for *forlorn* (*i.e.* lost), *iron* for *isern*, &c.

The letter *s* is subject to the following interchanges:—

1. *S* with *d*. See D.
2. *S* with *th* and *sh*, as in the Laconian dialect of the Greek, in which *θες*, *Αθυσια*, take the forms *σιες*, *Ασυσια*. The English language formerly wrote *loeth*, *hath*, but now prefers *loves*, *hates*.

3. *S* with *t*. The Attic forms *φαι*, *Παιδαυ*, *συ*, were by the Dorians written *φαι*, *Παιδαυ*, *συ*. In like manner the German words *dis*, *nas*, *es*, *vasser*, appear in English as *that*, *what*, *it*, *water*.

4. *S* with *r*. The Greek island *Zakynthos* was the mother city of Saguntum in Spain, and no doubt gave its name to it. But the most abundant evidence of the interchange is to be found in the Somersetshire dialect of our own tongue.

5. *S* with *sh*. The English words *sleep*, *slay*, *smear*, *snow*, have for their German equivalents, *schlaf*, *schlag-en*, *schmear-en*, *schnee*.

6. *S* with *c*, *h*, and *n*, see those letters; and *x* (*i.e.* *ks*) with *g*. See X.

7. The sound *sw* at the beginning of words is often degraded by the loss of the sibilant or *w*, or both. Thus to the Latin *sauros* and *saudes* correspond the Greek *αἶψα*, &c., the German *sass*, and the English *sneet*. Again, *sop-or* and *somnus* (*sop-nus*) of the Latins correspond to the Greek *σῶπ-ωρ*, to the Gothic verb *insnepp-an*, the German *schlaf*; and the English *sleep*.

8. *Sp* is interchangeable with *ps*, *sk* with *x* or *ks*, and *sd* with *ds*. For the last we need only refer to the Doric use of *σδ* for *ζ*. Instances of the second interchange occur occasionally in Greek and Latin. *Φίξ*, the mistletoe, is written in Latin *viscus*; *ισχάρις* is the superlative of the adjective *ισχός* for *ισχάρις*. The Latin *miscuo* has for its participle *mixtus* as well as *mixtus* (= *mixtus*). But Old English affords the most numerous instances of this metathesis. Thus arise the double forms of *raps* or *rapp*, a wasp; *aspe* or *aspe*, tremulous (whence the name of the *aspen* tree); *hype* or *happ*, a hawk; also *frosc* or *froz*, a frog; *fusc* or *fisc*, a fish; *tusc* or *tux*, a tusk; *asce* or *axe*, older; *ascan* or *askan*, to ask. It is a mere accident if in our own tongue *ase* and *waps* have been rejected as vulgarisms in favour of *ask* and *wasp*. The provincials still prefer the *ks* and *ps*.

9. *S* is often lost. Thus the Greek neuter nouns in *ος* must once have had a corresponding *s* in the genitive, *γυνις*, *γυνιος*, &c., afterwards *γυνος*, *γυνος*. The Latin language often discards an *s*, particularly at the end of words, as in the double forms *magus* and *mage*, *rideri* and *rele*, *ipsum* and *ipse*, *puer* for *puerus*. The French language abounds in examples of the loss of the sibilant. Thus from the Latin *asinus*, *magister*, *nostr*, *quadra-*

gesima, are derived, first *asne*, *maistre*, *nostre*, *carême*; and then, according to the modern orthography, *âne*, *maitre*, *notre*, *carême*, to say nothing of the silent *s* in such words as *maïs*, *vous*, *isle*, *est*, &c. In English we have *riddle* for Old English *raed-else*, German *rathsel*; *pea* for Old English *pisa*, Latin *pisum*; *cherry* for Old English *cirse*, Latin *cerasus*; *pike* from *spike*, &c.

10. On the other hand *s* is sometimes intruded, as *smelt* from *melt*, and *stumble* from *tumble*. Other examples are *s-cratch*, *s-squeeze*, *s-neeze*, *i-s-land*, *ai-s-le*, &c.

SA'ADI (that is, "The Happy") is the name by which is known Sheik Muslih Addin Ben Abdallah al Shirazi, one of the most famous of the poets of Persia. Born at Shiraz in 1184, where his father, although descended from Ali, Mohammed's son-in-law, filled a petty situation in the court of the Atabegs, he was educated at the Nizamiah College at Bagdad, where he studied science and theology, and held an *idrat* or fellowship. While practising religious austerities in the desert he was taken prisoner by the Crusaders, and forced to labour with a number of Jews in the fosse of Tripolis, from which he was ransomed by a rich merchant, whose daughter he afterwards married. A great part of his subsequent life was spent in travelling, and he is said to have visited India, Turkestan, Syria, Egypt, Abyssinia, Barbary, Asia Minor, and Europe, as well as to have made the pilgrimage to Mecca fifteen times. The last years of his life were spent in the practices of a dervish in the neighbourhood of Shiraz, and he was an old man when he began to write. His words have the placid wisdom of experience, and they display in addition the grace and happiness of composition of a true poet. His style, elegant and simple, has nothing of the customary exaggeration of the Persian poets, while the ethical tone of his poems have made them favourites in the West as well as the East. The most celebrated are the "Gulistan" ("Rose Garden"), a series of anecdotes, maxims, and fables in prose and verse, and the "Bustan" ("Pleasure Garden"), which is entirely poetical. These were followed by the "Pend-Namih" ("Book of Instructions"). He died at Shiraz in 1275, where in modern times a beautiful tomb has been erected in his memory, and endowed with lands and gardens for the support of the dervishes appointed to watch over it.

The "Gulistan," with a Latin translation, was edited by Gentius, and published at Amsterdam in 1651, and it has since been translated into most European languages. It was translated into English by Gladwin, and published in Calcutta in 1806, and in London in 1808 and 1827. See also the translations of Eastwick (Hertford, 1852) and John Platts (London, 1873). A complete edition of the works of Saadi was published by Harrington at Calcutta (1791-95). The "Bustan" has been edited with a commentary by Maulavre Tummuzdey (fourth edition, Cawnpore, 1832), and an edition of the Persian text with a Persian commentary was issued by C. H. Graf in 1858.

SAALFELD, the capital of a former principality in Central Germany, now merged in SAXE-MEININGEN, is situated on the Saale, in a fertile country, and has 17,000 inhabitants, who manufacture woollen cloth, linen, sewing machines, porcelain, leather, tobacco, chicory, beer, gunpowder, and vinegar. The town has several churches, a gymnasium, and two ducal palaces, one of which contains a mint. Near it are some iron mines. In 1806 Prince Louis Frederick of Prussia was defeated and killed by the French at Saalfeld.

SAARBRUCK, a town on the left bank of the Saar, in Rhenish Prussia, is chiefly known as having been the scene of two engagements in the Franco-German War of 1870-71. On 2nd August it was bombarded by the French, and the Prussians, who occupied it in small force, were dislodged. This was the first real engagement of the war, and was the occasion when the Emperor Napoleon sent home the celebrated dispatch as to his son having received his "baptism of fire." Four days after, the Prussian generals Von Goeben and Von Steinmetz, with the first German army, gained a most decisive victory over the French at the adjoining village of Spicheren. The most severe part of the engagement was fought on some heights between Saarbrück and the town of Forbach, which latter place has given a name to the second conflict. The loss was great on both sides. The French, who were greatly superior in numbers at the commencement of the fight, were compelled to retreat to Metz.

SAAVE'DRA. See CERVANTES.

SABADIL'LA. See CEVADILLA.

SABÆANS, the name given in the Old Testament to certain tribes whose ancestors or themselves are called Sheba or Seba. Much obscurity still rests over the question as to the countries occupied by these peoples, and strongly conflicting opinions are maintained by scholars upon the subject. The references in the Old Testament indicate that the country known as Sheba was rich in incense, spices, precious stones, and gold, and that its inhabitants carried on an extensive commerce with other nations of Asia. (1 Kings x. 1; Job vi. 19; Ps. lxxii. 15; Isa. lx. 6; Jer. vi. 20; Ezek. xxvii. 22; and Joel iii. 8.) According to the theory most generally accepted, the country mentioned in these passages represents the greater part of the Zemen or Arabia Felix, its chief cities being Uzal and Sephar. It is supposed that the Queen of Sheba who visited Solomon came from this country, but Josephus declares that she came from Ethiopia ("Antiq. Jud." viii. 6, sec. 6). He also mentions that the capital of Ethiopia, which was afterwards called Meroë, was in the time of Moses called Saba. It has been suggested that there were two colonies or nations of Sabæans, one occupying the Arabian and the other the African shore of the Red Sea, but both belonging to the same race. Some of the ruins found in Arabia Felix are in the Nubian style of architecture, and it is known that that part of Arabia was often subjugated by the Nubians.

The capital of the Sabæi in Arabia is called Saba by the Arabic writers, according to whom the founder of the city made in its neighbourhood a vast mound or dam in order to form a reservoir to receive the waters which came down from the mountains, and thus prevent floods while retaining a store of water. This dam broke down, and the water carried away the whole city with the neighbouring towns and people in the third century before the Christian era; but if such were the case it would appear from an account given by Strabo that the Sabæans had again recovered a large portion of their former prosperity. The Sabæans of Job i. 15 seem to have been a Bedouin tribe of North Africa.

SABAISM was the name given to a religious system which anciently prevailed to a great extent in Arabia and Mesopotamia. Sabalism is frequently confounded with the Sabæi, and is sometimes described as the religion of the latter people; but the two words are quite distinct, and are written differently in the Semitic languages. Sabalism would be written more correctly Tsabalism. It was derived, according to its followers, from Tsabi, the son or brother of Enoch, but is more probably derived from their worshipping the "Host of Heaven." According to the Arabic writers it was the same as the religion of the ancient Chaldeans, and appears to have been one of the earliest and simplest forms of idolatry. As a religious system it no

longer exists, but the name has been frequently, though incorrectly, applied to the Mandaites, or Christians of St. John, as they have been called.

SA'BAL. See PALMETTO.

SAB'AOTH, THE LORD OF, a phrase which occurs twice in the New Testament (Rom. ix. 29; James v. 4), represents the Greek form of the Hebrew *Yahreh tsebdôth*, a formula very common in the Old Testament, signifying the divine leader of the armies of Israel. In the Authorized Version *Yahreh tsebdôth* is translated by "Lord of Hosts," "Lord God of Hosts."

SAB'BATH (Heb. *shabbâth*, a day of rest, from *sha-bâth*, to rest, or possibly connected with *sheba*, seven). In the Old Testament the name Sabbath is applied to several of the festivals of the Israelites, and chiefly to the seventh day of each week, the seventh month of each year, every seventh year, and the great year of JUBILEE.

The division of time into periods of seven days is one that has existed from a very remote period throughout a great part of the Eastern world. It prevailed at periods long anterior to the commencement of Hebrew history among the Hindus, Assyrians, Egyptians, Persians, and Arabians; and when a new world was revealed to Europe by the discovery of America, the Peruvians were found to be dividing their time into weeks of seven days. The origin of this custom is unknown, but the most reasonable suggestion that has been offered in explanation is that which regards the week as a broad subdivision of the lunar month, the four quarters of the moon, each lasting about seven and three-eighths days, and connects it with the adoration of the heavenly bodies, the most widespread of all forms of nature worship. A special sanctity has been attached to the number seven by many nations, but there does not appear to have been any widespread custom of attaching special religious observances to the seventh day. Recent Babylonian discoveries have shown that the Old Babylonians regarded the seventh day as to some extent raised above the rest, calling it *Shabat-tur*, or "day of the heart's rest;" but with this possible exception, the institution of the Sabbath as a day of special rest and devotion seems peculiar to the Israelites. The question of its origin among the latter people is materially affected by the modern theories concerning the history of that people, noticed under PENTATEUCH; but the necessary limits of this article will prevent any further consideration of them here, beyond the mention of the fact that in accordance with the theories of Wellhausen and others the Sabbath must be regarded as the transformation of a primitive observance connected with the original nature worship of the people. The account given in the books of the Old Testament differs entirely from this, and we find the observance of the Sabbath included in the "Ten Words" which form one of the earliest monuments of the Torah. According to many of the Rabbis the institution of the Sabbath dates from the sweetening of the waters of Marah, recorded in Exod. xv. 25, 26; but the foundation of this opinion is of the slenderest kind, and the first incontrovertible reference to this event is found in Exod. xvi. 23, 30, where it is associated with the story of the manna. In the version of the Ten Words preserved in Deut. v. 6-21, the observance of the seventh day as a day of rest is associated with the memory of the deliverance from Egypt; but in the version of Exod. xx. 2-17 the sanction of the commandment is found in the story of the creation given in Gen. i. 3. In other parts of the law we find provision made for a complete cycle of Sabbath observances, all combined by the sacred number of seven, and based upon the already admitted recognition of the seventh day. Of these the first in order is the sabbath of weeks, or Feast of Weeks, the time of which was calculated from the second day of the Passover, "the morrow after the Sabbath to the morrow after the completion of the seventh week." This period

covered the whole of the grain harvest, commencing with the barley and ending with the wheat, the last day being a day of holy convocation. The seventh month of the year was also set apart as sacred, and as it marked the period when the labours of the year had been accomplished, it was celebrated as a joyful holiday season. It opened with the Feast of Trumpets, and though it contained the solemn fast and sacrifices of the day of atonement, it included also the brightest of all the Israelite festivals in the Feast of Tabernacles. A further development of sabbatic observance is found in the institution of a sabbatical year, which is first commanded Exod. xxiii. 10, 11. By this injunction the land was to be tilled and reaped for six years, but was to be allowed to lie fallow on the seventh, the natural produce being left for the poor and the beasts of the fields. In Lev. xxv., where the commandment is repeated, a harvest of special abundance is promised for each sixth year, sufficient to last for the interval of three years between the harvest of the sixth and that of the ninth year, and the owner of the land is permitted to share with his servants, strangers, and cattle in its natural increase. In Deut. xv. 1-18 the commandment is enlarged by the injunction to remit all debts between Israelites every seventh year, and to release all save willing slaves after seven years' service. Finally, we have the counting of seven times seven years for the celebration of the JUBILEE, which was to be held on the fiftieth (*i.e.* the next following) year. The design of the sabbatical and jubilee years seems to have been to impress upon the people their dependence upon Jehovah, and to inculcate lessons of kindness and consideration for others; but like sundry injunctions of the New Testament in Christian times, the commands seem to have been regarded as too high to attain to in practice. It does not appear that either was ever generally observed by the nation, and this general neglect is assigned by the chronicler as one of the reasons for the Babylonian captivity (2 Chron. xxxvi. 21). Even the observance of the weekly Sabbath appears to have been greatly disregarded before the Captivity, but after the return and the work of Nehemiah a new era began, and the weekly Sabbath became an institution of immense importance. The rest of the Sabbath was held to include the cessation of all unnecessary work and business, and attempts were made to "fence about" the ordinance in a minute manner. For such a task the Jewish doctors possessed special qualifications, and at the time of Jesus they had drawn up a list of thirty-nine important restrictions, together with a host of minor deductions from them, "the thirty-nine fathers and their descendants," for the proper observance of the Sabbath. Many of the prohibitions were fantastic and absurd, and some of the questions, gravely debated by learned Rabbis, were of the most childish character.

One unfortunate result of this spirit of literalism is said to have been that in times of grave national danger the people refused to defend themselves on the Sabbath, and in the wars of the Maccabees and those against the Romans (63 *BC*.) they suffered heavy loss on this account, and this restriction was in consequence given up. Another result was that as the rules were too strict and narrow for any but the most favourably circumstanced to observe, a number of legal fictions, as ingenious in their way as the restrictions themselves, were designed for their evasion, these arrangements being known as *Trübbs*, mixture or connection; at the same time it must not be supposed that the Jewish Sabbath was observed in anything like a grim puritanical spirit. The Jews never lost the idea that the Sabbath was to be a day of rejoicing, and for its proper celebration it was necessary that the best dress should be worn, that the best meals should be eaten, even the poorest were to try and have three meals. It was especially a day for the gathering of friends at dinner, and in Luke xiv. 1 we have an account of the acceptance of an invitation to

one of these feasts by Jesus. Few things in the life of Jesus seem to have given more offence to the Pharisees than his disregard of the fantastic injunctions with which they had burdened Sabbath observance, and we find accounts of his controversies with them on this subject in all the Gospels.

Passing from the Gospels to the Acts of the Apostles we find that while the Jewish Christians continued to observe the Sabbath, yet the rules laid down for the Gentiles (Acts xv. 22-29 and xxi. 25) have no reference to it, and the few allusions to be gleaned from the Epistles point rather in the direction of its abrogation than its continuance. Sabbath-breakers are never included in any list of offenders by the apostles, and in Col. ii. 16, 17, and Rom. xiv. 5, 6, St. Paul places it among matters of indifference, in which men should act for themselves, being careful only to observe mutual charity. At the same time, although no direct command is given, there are allusions in the Acts and Epistles to a custom existing among the Gentile converts of assembling for special religious service on the first day of the week, and we find from the writings of the early fathers that this custom soon became very firmly established. The first day of the week was chosen in honour of the resurrection, and while in the East the Jewish converts, and those under their influence, continued to observe the Sabbath as a feast, in the West it came to be regarded as a fast, as on that day the Lord had lain in the grave, the "Lord's Day" being carefully distinguished from the Sabbath both in the East and West. From what we know of the circumstances of the church of the first centuries, it is manifestly impossible that the LORD'S DAY can have been observed in a manner similar to the Jewish Sabbath, nor can any passage be found in the writings of the fathers before Constantine prohibitory of any occupation or work upon it. When, however, Christianity became the religion of the empire it appears to have been decided to put honour upon the great Christian festival of the Lord's Day, and in 321 it was enacted by an imperial edict—"Let all judges, citizens, and artificers rest on the venerable Sun-day. But those in the country may freely and lawfully apply themselves to agriculture, since it often happens that the sowing of corn and planting of vines cannot be so well performed on any other day, lest by neglecting the opportunity the benefits bestowed by the divine bounty should be lost." This celebrated edict was followed by others which extended the prohibition to many other occupations, and to many forms of pleasure regarded as innocent on ordinary days, and from this period may be traced the tendency to confuse the Jewish Sabbath with the Christian Lord's Day which afterwards became so fully developed. By the close of the fifth century the Lord's Day had become very generally a day of rest from all ordinary work, and we find Leo I. in 460 repealing that portion of the edict of Constantine which exempted agriculture from prohibition, and enforcing the abstention from work upon citizens and agriculturists alike. With the development of doctrine the Jewish Decalogue was taken as representing a summary of human duty, and it was impossible that the fourth commandment should be regularly read and commented upon without connecting its sanctions with the observance of the Lord's Day as enforced by ecclesiastical usage and imperial law. By the schoolmen the principles of Sabbatarianism were further developed and extended, and though Christian practice did not reach the extreme strictness enforced by the Rabbis, the obligation of the fourth commandment was regarded as applying to Christians no less certainly than to Jews, though the day of rest had been changed from the seventh to the first. At the Reformation the theory of the binding force of the Jewish law and of the holiness of days was rejected by the leading reformers; but in the ferment of religious and

doctrinal controversy which then arose, many different opinions were promulgated respecting the sanctity of the Lord's Day and the Sabbath. One party among the Protestants espoused the opinion that the change from the seventh day to the first was unwarranted, and that the practice of the church during all the preceding centuries had been based upon error. They proposed the giving up of the Lord's Day as a day of rest, and the keeping of the Jewish Sabbath in harmony with the injunctions of the fourth commandment. Under the name of Sabbatarians they are found existing as a considerable party for over a century, and they are at the present day represented by the diminutive sect known as the Seventh-Day Baptists.

At a later period the term Sabbatarian was used to designate those who taught that the Lord's Day inherited the sanctions of the fourth commandment, a meaning which it still retains. A much larger party on the Continent maintained the view taken up by the Reformers, and while acknowledging the fitness of observing the Lord's Day as a day of rest and worship, yet declined to import into it the elements of restraint belonging to the Jewish Sabbath, or to consider the injunctions of the fourth commandment binding upon Christians. This view still maintains its ground among most of the Protestant churches of the Continent. In England the Puritans, though they adhered to the observance of the Lord's Day in keeping with the ancient and general usage, yet insisted very strongly that it should be observed after the manner of the Jewish Sabbath. They even went further, for they added elements of austerity quite foreign to the Jewish custom, and eliminated as far as possible the joyous, social elements of the day to which we have referred. The enforced reading of the famous "Book of Sports Lawful to be used on Sundays" in 1663 by the clergy, at the command of Laud, was the commencement of a tremendous controversy between the Puritan and High Church divines, in which some of the ablest writers on both sides were engaged. The controversy was continued throughout the whole of the Puritan period, and it has since been maintained between the successors of the two parties—i.e. the Evangelical and High Anglicans of the present day. In recent times the representatives of the Broad Church school have also for the most part opposed the Puritan conception of the Lord's Day, and most of the leaders of what is called Liberal Christianity, are found labouring with those who advocate the opening of museums, picture galleries, libraries, &c., on the Sunday. Up to the present, however, the supporters of the Sabbatarian theory have succeeded in defeating most of these projects, and they are sustained in their policy by many who wish to preserve for the day its character as a day of rest apart from all theological considerations. Into the merits of the controversy it is impossible to enter in this place, but the reader who wishes to examine the subject will find the Puritan view embodied in the famous Westminster Catechism, and ably and elaborately defended in the writings of Cawdrey and Palmer ("Sabbatum Redivivum, or the Christian Sabbath vindicated," two vols., 1645-52), and John Owen ("Exercitations concerning a Day of Sacred Rest," 1671), while Taylor, Baxter, Milton, Barclay, Healin, and Sanderson, may be consulted on the other side. Among modern works on the subject a valuable statement of all shades of opinion will be found in R. Cox's "Literature of the Sabbath Question" (two vols., Edinburgh, 1865). See also Dr. J. A. Hessey's "Sunday; its Origin, History, and Present Obligation," being the Bampton Lectures for 1860 (new edition, 1866); and "Robertson's Sermons," first and second series (1856). The doctrine of the Roman Catholic Church on the subject will be found in the Catechism of the Council of Trent, and for the Jewish laws and customs see Kuenen's "Religion of Israel" (English translation, London, 1874-75).

SABBA'TIA, a genus of North American plants, belonging to the order GENTIANÆ. There are several species of *Sabbatia*, all of which are characterized by the possession of a pure bitter principle, and on this account they are extensively used in North America in intermittent and remittent fevers, and as tonics. The species most commonly used is the *Sabbatia angularis*.

SABDARIF'FA. See HIBISCUS.

SABEL'LIUS, a Christian theologian of the third century, of the circumstances of whose life scarcely anything is known, beyond the facts that he was a presbyter of Ptolemais in the Pentapolis, and that he wrote somewhat about the period 250-260 A.D. The chief design of his works was to protest against the doctrine concerning the divine nature then gaining general acceptance in the church, which afterwards developed into the orthodox doctrine of the Trinity. To Sabellius this doctrine seemed to be opposed to monotheism, and to represent rather ditheism or tritheism, and he taught in opposition that God, the *monas* or pure deity, unfolded himself in creation and the history of man as a Trinity. The divine energy which created and sustains the universe, and after whose image man was created, he appears to have identified with the Father; the divine energy exerted to raise man from the fall, and revealed to man in the person of Christ Jesus, with the Son; and lastly, the divine energy operating upon the minds and hearts of men he considered to be represented by the Holy Spirit. These three manifestations of the deity he associated with the periods of the law, the gospel, and the church respectively, and he further considered that as the design of their manifestation was accomplished they were reabsorbed in God, so that in the final consummation God would be all in all. The foregoing, while probably an outline of his theory, leaves many important points in obscurity, but unhappily his teachings have only come down to us through the somewhat untrustworthy accounts of his opponents. In his own church there was a party who were strongly opposed to his views, and who successfully appealed to Dionysius of Alexandria for their condemnation, while in the fourth century his followers were formally branded as heretics. The doctrine he taught, however, stripped of its peculiar Gnostic ideas, has never ceased to be held in the church, and as F. W. Robertson points out in his sermon on the Trinity, many persons, while believing themselves to be orthodox Trinitarians, hold unconsciously Sabellian doctrine, the theory of a single divine essence revealed under three manifestations being so much more easy to conceive than the orthodox doctrine upon the subject. For an account of Sabellianism see Reville, "Hist. du Dogme de la Div. de Jesus Christ" (English translation, London, 1870).

SABIA'CEÆ is an order of plants belonging to the POLYPETALÆ. There are only thirty-two species, shrubs or trees, natives of tropical and subtropical regions, especially in the northern hemisphere. This order is nearly allied to the SAPINDACEÆ and ANACARDIACEÆ, but differs in many respects from both these orders, above all in the position of the stamens, which are equal in number to the petals, and opposite to them. The calyx has four or five divisions; there are four or five petals; the disc is small, annular, and lobed; the stamens are situated at the base of the disc or above the torus; the ovary is sessile, with two or three cells; in each cell there is one ovule, or often two, with ventral raphe. The order takes its name from the genus *Sabia*, so called from the Indian name, *Sabja*, of one of the species. The species of this genus form ornamental climbing shrubs with smooth lanceolate alternate leaves, suited to the shrubberies of this country.

SABINA, POPPÆA, the famous mistress, and afterwards wife of the Emperor Nero, was the daughter of Titus Ollius, but assumed the name of her grandfather, the Consul Poppæus Sabinus. She was married when Nero

became enamoured of her exquisite beauty; but her husband was soon sent to a distant province and eventually got rid of. As the empress-mother Agrippina opposed her sway, Poppæa induced Nero to have her assassinated; and as she wished to enjoy the imperial title as well as power, she procured the divorce of Nero's wife, Octavia (A.D. 62), and was married by the emperor in her stead. She died from a kick given her by Nero in a drunken fit while she was in a delicate state of health (A.D. 65). She was at once enrolled by the repentant sensualist among the gods, and a splendid temple built in her honour. The tales of the luxury of Poppæa are most extraordinary. She was as cruel and heartless as she was beautiful.

SABINES, an ancient people of the Italian race and the Umbrian stock, settled along the Apennines. The **SAMNITES** are a southern branch of the Sabines. The latter term is limited in strictness to the dwellers in the land between Latium, Etruria, and Umbria. They were a shepherd people living in hilly regions, simple, virtuous, frugal, and truthful, superstitious and uncultured, but free and independent, ruled by officers of their own choosing, strictly republican. A curious feature of their custom is the *ter sacrum* or "sacred spring," vowed in any emergency. In that spring all the males born were sacred to the gods, and were sent out at their maturity to form a new colony. The Sabines were long the strongest power in Italy after the decay of the Latins, but their disintegration prevented them from a lasting domination, and they were subdued by Rome because of the closely knit constitution of the latter (B.C. 290). Some Sabines were always believed to have formed a part of the first founders of Rome. See **ROMA**.

SABLE (*Mustela zibellina*) is a mammal belonging to the **MUSTELIDÆ** or Weasel tribe and nearly allied to the **MARTEN** (*Mustela martes*). The sable is the most valuable of the fur animals. Its length, exclusive of the tail, is about 18 inches. The head is conical, with a pointed snout and large, pointed ears. The tail is bushy. The legs are stout, and the feet are covered with hair down to the toes. In summer the fur is a lustrous brown line, while the neck is grayish and the head is spotted with white. In winter the fur becomes much darker. The hair of the tail is commonly used for the brushes or pencils of artists. The fur known as American Sable is obtained from another species, the American Marten (*Mustela americana*). The sable inhabits the northern parts of Russia and Siberia. It lives principally in trees, concealing itself by day and issuing forth at night in search of prey, which consists of hares, small mammals, and even birds. The chase of the sable is attended with considerable difficulty, on account of the barren, cold regions which it frequents, and because of its agility and wariness. The dark winter fur is very valuable, considerable numbers are exported to Western Europe, where a single skin of fine quality is worth from £12 to £15. The animal is caught in various kinds of traps.

SABOTS, a kind of wooden shoes much worn by the French and Belgian peasantry, and chiefly manufactured in the French departments of Aisne, Aube, and Maine-et-Loire. Their brown-red colour is produced by exposing them to the smoke of burning wood. In marshy localities their utility is considerable.

SABRE, a thick-backed heavy sword, with which dragons are armed. It is slightly curved, but not sufficiently to prevent thrusting and well handled it forms a very effective weapon for close-quarter fighting, though it is not improbable, in view of the exigencies of modern warfare, that cavalry in future will rely less upon their swords than upon their fire-arms.

The *sabretache* is an embroidered pocket-like appendage hung by small belts to the sword-belt of some Cavalry officers. It is of little utility.

SAC AND SOC, ancient terms of the early English legislative arrangements. *Sac* meant the power of holding courts of law by great landowners, and was granted specially by the king. In these courts penalties could be imposed for the settlement of disputes on the estate. *Soc* was the right of jurisdiction over a special district granted to an official or to a landowner. *Sac and soc* together generally implied also *tol*, or power to hold markets, and *team*, or power to compel a man to say whence he had obtained goods which seemed suspicious.

The ancient private jurisdictions of the early English were organized with the manorial courts, courts leet, &c., of feudal times.

SACCHARIC ACID, an acid obtained by the action of nitric acid on cane sugar, glucose, or milk sugar. It is uncrystallizable, presenting the form of a colourless deliquescent mass, very soluble in water and alcohol, but insoluble in ether. The formula is $C_6H_{12}O_6$. It reduces salts of gold and silver. Heated with potash it is converted into potassium acetate and oxalate. It is dibasic, forming neutral and acid salts, mostly crystalline; the two salts of potassium have the formula $C_6H_5K_2O_6$ and $C_6H_5KO_6$ respectively. It forms an ether, or ethyl saccharate, which is crystalline, and soluble in water and alcohol; it has the formula, $C_6H_5(C_2O_5)_2O_4$. When the solution is treated with gaseous ammonia it yields saccharamide ($C_6H_{12}N_2O_6$), which is crystalline. Acids decompose it into ammonia and saccharic acid.

SACCHARINE, the name given to a new sweetening agent derived from coal tar. It was discovered by Fahlberg, and is obtained from the hydrocarbon toluene (C_7H_8 or $C_6H_5CH_3$). The chemical name of this remarkable compound is benzoyl sulphonie imide, and the formula is $C_6H_4 \begin{Bmatrix} CO \\ SO \end{Bmatrix} NH$. It is a white crystalline substance,

not very soluble in cold water, but more so in hot water. It is very soluble in alcohol and ether. It is the most intensely sweet substance yet discovered. It has about 230 times the sweetening power of the best cane sugar. One part gives a very sweet taste to 10,000 parts of water. Its properties are antiseptic, and it has no injurious effect on the human system, through which it passes unchanged. It can therefore be given to diabetic patients where sugar is disallowed. The juices of fruits can be sweetened without the use of sugar at all, the amount of saccharine required being so minute that a sweet jelly can be made which consists of the fruit almost pure. The new substance has not yet been introduced into the market on the large scale, but works are being erected in Germany for this purpose; and there appears to be an extensive field of application for this the most recent and most remarkable of all the discoveries from coal tar.

SACCHAROID (Gr. *sacchar*, sugar, *eidos*, form), a term applied to crystalline marbles presenting a fanciful resemblance to the structure of loaf sugar. A typical example of such a rock is the well-known statuary marble of Carrara in Northern Italy.

SACCHAROMETER, an instrument used principally in the operations of brewing and making sugar. It serves to indicate the density of the liquid extracted from malt, or the degrees to which the juice expressed from the sugar-cane is concentrated previous to undergoing the process of crystallization. One form of this instrument is that of the **HYDROMETER**, and another is an adaptation of the polariscope.

SACCHAROMYCETES. See **ASCOMYCETES**.

SACHEVEREL, HENRY, D.D., was born about 1672, at Marlborough. He was entered at Magdalen College, Oxford, and became a fellow of it. He took his degree of M.A. in 1696, of B.D. in 1707, and of D.D. in 1708. In 1705 he was appointed preacher of St. Saviour's, Southwark; and it was while in this situation that he de-

livered his two famous sermons, the first at the assizes at Derby, 15th August, 1709, and the second before the lord mayor at St. Paul's, 5th November, in the same year. In these sermons he assailed with the utmost rancour the principles of the Revolution and the Act of Toleration, advocating at the same time the doctrine of non-resistance to regal authority, and declaring that the church was in danger, and that dissent must be suppressed. These discourses having been printed, were both in the December following brought under the notice of the House of Commons, which passed a resolution denouncing them as "malicious, scandalous, and seditious libels." The author and printer were at the same time ordered to attend at the bar of the House, and it was resolved that Sacheverel should be impeached of high crimes and misdemeanours. It is asserted by Swift and other authorities that his real offence, in the eye of the Whig ministry of the day, was that he pointed, as was conceived, at the Lord-treasurer Godolphin, in a passage about "the crafty insidiousness of such wily *Volpones*." Volpone seems to have been a popular nickname of Godolphin. The trial commenced before the House of Lords in Westminster Hall, on 27th February, 1710, and lasted till 20th March, on which day a majority of their lordships (sixty-nine to fifty-two) pronounced Sacheverel guilty; and three days after sentence was passed adjudging him not to plead for three years ensuing, and ordering his two sermons to be burned by the common hangman. The populace celebrated this impotent conclusion of the affair with bonfires and other rejoicings; and when in May following he set out to take possession of a living in Shropshire, to which he had been presented, his journey was a continued triumph. There is no doubt that this affair mainly contributed to the overthrow of the Whigs in the autumn of the same year. On the expiration of his sentence, in March, 1713, Sacheverel preached at St. Saviour's Church on the Christian triumph, or the duty of praying for our enemies, and again published his discourse. Within a month after the removal of his suspension the queen presented him to the valuable rectory of St. Andrew's, Holborn. He never appeared again as an author, except in a dedication prefixed to a volume of posthumous sermons by the Rev. W. Adams, published in 1716. He was suspected of being concerned in the alleged plot of Bishop Atterbury, who is believed to have written the defence which he delivered on his impeachment. He died on 5th June, 1724.

SACHS, HANS, the shoemaker-poet, chief of the German *meistersingers*, was born at Nürnberg, where his father was a tailor, on 5th November, 1494. He acquired the rudiments of a classical education at the Latin school of his native town. During the period of his apprenticeship to the trade of shoemaking he studied poetry under a fellow-townsmen, Leonard Nannenberg, a weaver by trade, but also a *meistersinger*, who initiated him into the mystery of verse-making according to the rules of the *meistersingers*. Successful as a poet and prospering in his calling, he enjoyed the universal respect of his fellow-citizens during a long, cheerful, and peaceful life. In the excitement of the Reformation he sympathized strongly with Luther, whom he hailed in one of the finest of his allegories as the "Wittenberg Nightingale," and at short intervals he sent out a multitude of dialogues and short pieces in favour of Protestant principles, which had a great influence all over Germany. About 200 of these have been preserved. He wrote also many plays which were at that time successful, a large number of "Schwanke" or "Merry Tales," and an immense number of songs. He died on 25th January, 1576, at the age of eighty-two.

Hans Sachs was one of the most prolific writers Germany has ever produced, for when in 1567 he made an inventory of what he had written during the preceding fifty-two years, he numbered upwards of 6200 different

pieces: viz., 4275 songs written according to the rules of the *meister-gefang*, 208 comedies and tragedies, about 1700 *schwanke*, dialogues, fables, &c., and 73 psalms and

ten for a time into oblivion, but it was revived in 1776 by Goethe, whose poem, "Hans Sachs," recalled the *meister-singer* to the memory of his countrymen. Since then the life of the poet and his writings have received affectionate study in Germany, and several partial collections of his writings have been issued. For the latest of these see vols. iv., v., and vi. of the collection of "Deutsche Dichter des 16. Jahrhunderts," by Goedeke and Tittmann (Leipzig, 1870-72; new edition, 1874). A monument to the poet was erected at Nürnberg in 1874.

SACK, a Spanish wine of the dry kind; in French, *vin sec*. It is called *sack* in an article cited by Bishop Percy, from an old account-book of the city of Worcester: "Anno Eliz. xxvij. Item, for a gallon of claret wine and *sack*, and a pound of sugar." The term was in common use in the time of Shakspeare, and even up to the middle of the eighteenth century. Sack is simply another name for what we now term sherry, and was used to denote dry as distinguished from sweet wines. Some confusion as to its exact application has arisen from the fact of the vast importations of sweet wines being called Malaga or Canary sacks, one of which still retains the name of sack. It is little used, but being provided for sweetness, it has caused some misunderstanding as to the original dry sack.

SACKBUT, the old English name for the predecessor of the *trombone*, a bass trumpet whose length of tube is alterable by means of a slide. The word is an odd compound of the Hebrew *sag*, chest, and the Old German word *but*, chest or storeroom, something therefore which exhausts the chest in providing the wind for its performance.

In the Authorized Version the *SAMBUKA*, a kind of larp (*Scheka* in Hebrew), is rather absurdly translated sackbut, as if it were a bass trumpet—a phrase originally on the part of the scholars of King James's time which those of the Victorian era have foolishly perpetuated, as also in the case of the "dulcimer" of the same verse which represents the Hebrew *sumponnah*, i.e. bagpipe, and which they have likewise carefully perpetuated.

The sackbut of Old English times could be drawn out with a slide, like our trombone, and is frequently found represented in old MSS. Dr. Burney tells of the difficulty of finding sackbut (i.e. trombone) players for the Handel festival of 1784, so completely had the instrument then dropped out of use.

SACKVILLE, CHARLES, Earl of Dorset in Charles II.'s time (1637-1706). See DORSET.

SACKVILLE, LORD GEORGE, a younger son of the Duke of Dorset, was born on 26th January, 1716. During the reign of George II. he was employed both as a statesman and as a soldier; he served at Dettingen and Fontenoy; and at the battle of Minden, fought in 1759, he commanded the British forces under Prince Ferdinand of Brunswick. Having failed to execute the prince's orders to charge, so that the victory was rendered less decisive than it might have been, he was insulted by his commander, and, at his own request, recalled to England, where he demanded a court-martial, by which, on 3d April, 1760, he was adjudged incapable of serving thereafter in any military capacity. George II., who was highly incensed at Sackville's conduct, took every means of rendering his punishment most galling. In the reign of George III. he returned to public life; and having attached himself to Lord North, was made secretary of state

for the colonies in 1773, and had the direction of the American War. In 1782 he, with his leader, retired from office, having been raised to the peerage by the titles of Viscount Sackville and Baron of Bolebrook, titles united to the dukedom of Dorset by the accession of Lord George's eldest son to that dignity. In 1770 Lord George Sackville took the name of Germain in consequence of a bequest. He died on 26th August, 1785. He is one of the many persons to whom the famous letters of Junius have been ascribed, but this theory seems now abandoned.

SACKVILLE, THOMAS, afterwards Lord Buckhurst, and later still Earl of Dorset, was born in 1536 at Buckhurst, in Sussex. He was the only son of Sir Richard Sackville, the representative of a very ancient family, and a friend of the famous Roger Ascham. After studying both at Oxford and Cambridge, and taking the degree of M.A. in the latter university, he removed to the Inner Temple and was called to the bar. Shortly afterwards he was elected member of the House of Commons for Westminster, and later on for East Grinstead. In 1566 he was created Lord Buckhurst by Elizabeth. In 1570 he was sent on an embassy to France; and in 1587 was employed as ambassador extraordinary to the United States of the Netherlands, to adjust the differences between them and the Earl of Leicester, whose anger he drew upon himself in the discharge of this duty, and was in consequence imprisoned till the death of Leicester, when, in 1588, he was at once restored to Elizabeth's confidence, and filled a variety of state offices. In 1598, on the death of Burghley, he was made lord treasurer, which situation he held during the next reign till his death, which happened at the council table on 19th April, 1608. James I. created him Earl of Dorset. His letters, many of which are preserved in the Cotton Collection in the British Museum, show that he was distinguished by the qualities which befit a statesman, and confirm the judgment of his contemporaries.

His poems are the tragedy of "Ferrex and Porrex," called in the earliest (pirated) edition "Gorboduc;" "The Induction," or poetical preface to "The Mirror for Magistrates;" together with "The Complaint of the Duke of Buckingham," in the same collection. "Gorboduc" was written in conjunction with his friend Norton, who like himself had already earned fame as a poet in 1561 for the Christmas recreation of the Templars. It is deservedly immortalized Sackville, for it is the first great work in blank verse, and absolutely the first English tragedy. The first printed (pirated) edition of it was published in 1565, the year before the publication of the first English comedy, "Ralph Roister Doister;" and it is extremely curious to note that Shakespeare's birth (1564) was contemporaneous with the birth of the English drama in both its forms.

SACRAMENT, a term derived immediately from the Latin *sacra mentum*, the military oath or its obligation, but which is used in the Old Italian version of the New Testament as the Latin Vulgate as the equivalent for the Greek *mysterion*, a sacred secret or mystery requiring initiation. By the earnest of the fathers it is used to denote any mystery, as doctrine or thing pertaining to the Christian belief and worship, but later its use was restricted to certain *exterior* rites and ordinances believed to be divinely instituted to impart to the recipients an invisible *grace* in conformity with the visible ceremony. It was applied chiefly to the rites of baptism and the eucharist, but the theologians of the Roman Catholic and Protestant churches are not agreed as to whether the term is limited to these ordinances, or whether it includes others. Much of the controversy which has arisen upon this point turns upon the definition of the term itself, though the notion that a sacrament represents a visible form of an invisible presence is common to all.

The Greek and Latin churches believe that there are seven sacraments—viz., baptism, confirmation, the eucharist, pen-

ance, extreme unction, holy order, and matrimony. By Roman Catholic theologians these are divided into two classes—"sacraments of the dead" and "sacraments of the living." The sacraments of the dead are baptism and penance, the special purpose of which is the restoration of the soul dead in sin to the life of sanctifying grace. Baptism may be validly conferred upon infants without the exercise of reason, but penance and faith are requisite in the case of those who have attained to years of responsibility, and these graces are also essentially necessary to penance. The sacrament of extreme unction is not properly a sacrament of the dead, but it is held to be a means of restoring the life of such souls as, in danger of death, cannot have recourse to the sacrament of penance. Of the sacraments of the living, confirmation, the eucharist, extreme unction (when recourse may be had to penance), holy order, and matrimony, it is maintained that they can only be beneficially received by those who are already in a state of grace. Of the seven sacraments, three—viz., baptism, confirmation, and holy order—can only be once received, inasmuch as they "imprint a character," but the others may be received several times.

The Reformed churches for the most part believe in but two sacraments—baptism and the Lord's supper, on the ground that the New Testament mentions only these two as having been instituted by Christ. The "Apology" for the Lutheran confession of Augsburg mentions also penance or "absolution" as a true sacrament, but this was afterwards omitted from the list of the sacraments, and confession was retained by the Lutheran churches as a mere ecclesiastical institution. Among modern High Lutherans the sacrament of holy order has found advocates, and ritualists of the Anglican Church, while giving the pre-eminence to the sacraments of baptism and the eucharist, yet for the most part incline to the opinion that confirmation, penance, and holy order are also secondary sacraments, and some include also matrimony and extreme unction. The Presbyterian and Nonconformist churches of England and America recognize only the sacraments of baptism and the Lord's supper. Even these are discarded by the Friends as Jewish customs which ceased to be obligatory after the apostolic age, and they are also discarded by some of the "advanced" religious societies which yet retain the title of Christian. Some of the minor sects of the Christian world, including the Dunkers, Mennonites, Winebrennarians, and others, consider the rite of "feet washing" and the Lord's supper as co-ordinate and of equal obligation, basing their arguments upon John xiii. 1-17.

With respect to the efficacy of the sacraments and the mode of their operation, much has been written and many different opinions exist. The doctrine of the Roman Catholic Church is to the effect that the sacraments convey the grace they signify *ex opere operato*, producing their effect on the recipient by the virtue imparted to them by God, and not merely through the faith of the recipient, though proper dispositions on the part of the latter are also essential. The conditions of their efficacy are that the administrator shall have proper authority and the intention of doing what the church intends to be done, and that the recipient shall oppose no obstacle. The Lutheran churches hold that the efficacy of the sacraments is due to their own inherent virtue, but without faith on the part of the recipient they are powerless to convey a blessing. The doctrine of the great majority of Protestants, however, is that while the sacraments are real means of grace, they become so not from any virtue in them or in him that doth administer them, but only by the blessing of Christ and the working of his spirit in them that by faith receive them.

See also the articles under BAPTISM, CONFIRMATION, COMMUNION, EXTREME UNCTION, &c.

SACRAMENTARIANS was the name given in the sixteenth century to those of the reformers who opposed the doctrine of Luther concerning the presence of Christ in the sacrament. Their leader in the first instance was Andrew Karlstadt, and the controversy, which began about 1524, lasted many years, and ultimately resulted in the formation of the Lutheran and Reformed parties in Protestantism. After Karlstadt the chief leaders of his party were Bucer and Capito, and at the Diet of Augsburg the Sacramentarians presented a special confession embodying their views, which, from its being supported by the cities of Strassburg, Constance, Lindau, and Memmingen, is known in history as the Tetrapolitan Confession. The Swiss reformer Zwingli propounded a doctrine of the eucharist identical with that of Karlstadt, and his doctrine on this subject was embodied in the confession of the Helvetic Church. See **REAL PRESENCE**.

SACRAMENTO, a river of North America, rising in the north part of California, on a cross ridge connecting the coast range with the Sierra Nevada. It flows south 350 miles through the middle of the state, and joins the San Joaquin from the south at the head of Suisun Bay. It is navigable 295 miles, to Red Bluff, and its valley is the finest part of the state.

SACRAMENTO, a city and river-port of North America, and capital of California, one of the United States, is situated at the confluence of the American and the Sacramento rivers, 125 miles from San Francisco. It was founded in 1819, is now the chief depot for the northern gold mines of this state, has about 22,000 inhabitants and an extensive commerce. The city has steadily improved, and now contains many fine buildings. Most of the houses are surrounded by gardens, which, owing to the mildness of the climate, are evergreen. The chief building is the Capitol, which is one of the finest structures in the United States, and contains the State Library, with over 35,000 volumes. The town has suffered greatly from fires and inundations, owing to the lowness of its site. The business portion had to be raised originally 8 feet, and is now protected by a dam—"the levee." Sacramento carries on an extensive trade, and has important industries, such as the canning of salmon and fruit. It is also an important railway centre.

SACRED BABOON (*Cynocephalus hamadryas*) is a species of BABOON inhabiting Nubia, Abyssinia, and Arabia. This species was worshipped by the ancient Egyptians as the emblem of Thoth, a god who corresponded in many ways to the Greek Hermes; in this character it is represented in many sculptures. The Abyssinians call it the Deriyas.

In size the sacred baboon equals a large pointer dog; the face is elongated, naked, and of a dirty flesh colour, with a lighter ring surrounding the eyes. The callosities are dark. The tail is about half the length of the body, and tufted at the tip. The general colour of the fur is of a cinereous gray, with a tinge of brown, deepest along the back. In the male the head, neck, shoulders, and fore part of the body as far as the loins, are covered with a lion-like mane of long flowing hairs, contrasting with the clipped appearance of the rest of the body. This mane is wanting in the female, and her uniform and coarse fur is of a deep greenish or olive brown.

These baboons live chiefly on fruits and grain, but also on insects. They are found mainly in the neighbourhood of rocky precipices, whence they descend in bodies to plunder the corn-fields. These foraging expeditions are conducted with a great deal of method, the troop being headed by the old males, and scouts being posted on the flanks or rear of the line of march. When attacked they resist boldly, but they seldom, if ever, take the offensive with men. The sacred baboon displays considerable intelligence, and can be taught to perform many tricks.

SACRED BEETLE. See SCARABÆIDÆ.

SACRED HARMONIC SOCIETY. This, the most important association for the promotion of the study of sacred music in the world, was founded in 1832 by a few friends meeting in Lincoln's Inn, and giving performances, chiefly of Handel's music, in Lincoln's Inn Chapel. It soon migrated to Exeter Hall, Strand, where it remained permanently located until 1880. At the close of 1836 the society began to perform entire oratorios instead of short selections, and the "Messiah" was the first given. In 1837 it introduced Mendelssohn's "St. Paul" to London, the orchestra then numbering 309, but rising during the same year to 500. Walker's grand organ was built for the society in 1840. Mendelssohn conducted his "St. Paul" twice in 1844, and his new oratorio "Liljah" four times in 1847, when these works were performed by the society. Spohr also did it the like honour for his "Fall of Babylon" in 1843 and his "Last Judgment" in 1847. Signor Costa (afterwards Sir Michael Costa) was elected conductor in 1848, and retained that post till his death. He augmented the band and chorus to 700. The first London performance of Costa's "Liljah" marks 1856, and Rossini's "Stabat Mater" 1857; the latter year being also memorable for the society's great undertaking in providing the musical arrangements for the HANDEL FESTIVAL, a task it continued for many years.

Exeter Hall was sold to the Young Men's Christian Association in 1880, and the Sacred Harmonic Society removed to St. James's Hall. In 1882 it was found necessary to reconstruct it as a limited liability company, with a beneficial interest to its shareholders; and after a few changes following Sir Michael Costa's death the patronage of the society fell into the able hands of Mr. W. G. Cummings.

The plan of the society throughout has been the cultivation of amateur musical ability; and though eminent instrumentalists and vocalists are always engaged for leading parts yet the rank and file of the band and chorus are strictly amateurs. The library has become very full and rich, as may be supposed; and the society has earned a deep debt of gratitude for its half century and more of good solid educational work.

SACRED HEART OF JESUS, FEAST OF, is observed by the Roman Catholic Church on the Friday after the Octave of Corpus Christi. The cult of the Sacred Heart of Jesus is of very modern origin, arising as it did out of a vision reported by Marguerite Marie Alacoque, a French nun of the order of the Visitation, who lived at Paray la Moniale, in Burgundy, in the latter half of the seventeenth century. The special worship originated by her gradually spread through France, and it received papal approval from Clement XII. (1732 and 1736) and Clement XIII. (1765). Confraternities of the Sacred Heart are now disseminated through all parts of the Roman Catholic Church. The Ladies of the Sacred Heart are a religious congregation devoted to education, having their headquarters at Paris, and numerous establishments in Europe and America. The congregation was founded by Joseph Desiré Vaux, S.J., in 1800, and their constitution received papal approval on 22nd December, 1827, the Pope, Leo XII., inviting the ladies to Rome, and assigning them the convent and church of Trinità di Monti.

SACRIFICE, considered as a devotional rite, implies the act of dedicating something to a deity, but the term is also equally used to designate the thing which is dedicated. The practice of offering sacrifice is one of the most ancient and most widely spread of all religious observances, and as it has been suggested by a variety of emotions, so it has been used as an expression of many different ideas. In the primitive stage of human life men generally make their gods after their own image, and the practice of offering

presents to one another as tokens of friendship, or as a means of appeasing wrath or obtaining favour, naturally suggest methods of approach to the gods. The earliest emotion to find expression seems to be that of fear, and we find this feeling entering very largely into the sacrifices of rude and uncivilized peoples. In the ordinary course of nature many things happen which appear to be hostile to man. Storm, lightning, flood, disease, &c., are all dreaded as weapons in the hands of the invisible powers, and hence men have ever sought to avert disaster by offering presents and sacrifices. Next in order to the emotion of fear appears to come that of a desire to induce the deity to interfere on behalf of his worshippers in their conflicts with their enemies or labours against natural forces, and such a feeling finds its most appropriate expression in the offering of a sacrifice or the promising of one, in order to obtain the desired benediction. Of a higher grade is the feeling of gratitude for blessings bestowed, which has prompted thank-offerings for the fruits of the harvest and the multiplication of the domestic animals, upon which so much of human life is dependent; while the highest point in this phase of religious thought is reached when men feel conscious of guilt and transgression, and offer sacrifices as "offerings for sin." Other occasions for offering sacrifices were suggested by the practice of divination, by the ceremonies attendant upon the making of vows, agreements, and covenants, and they also formed an appropriate accompaniment to tribal festivals, weddings, &c.

With respect to the mode of offering we find the medium of fire has always been the most favoured. It is true that libations have among many nations been poured upon the ground as offerings to the gods, and sacrifices have been cast into the waters to gratify the gods of the sea and the streams, but the propensity of the gods have been endowed with dwelling-places in the heavens, and the mysterious force of fire, which carries upward in smoke and fume the offerings cast up on it, has always seemed to be the best mode of communication. In the early hymns of the Rig Veda, Agni, the god of fire, receives the largest amount of adoration, and we find in them many references to the ascent of the offerings to him in the flames kindled upon the altar. The idea that the deity was fed or gratified by the smoke from the altar is one that is common to many distinct systems of religion, and when experience showed that certain woods and gums when burnt gave off a pleasant smell, it was a very simple and natural act to bring them to the fire—offerings made to the gods.

Of the materials for sacrifice we find that nearly everything of use or value to man has been pressed into service, and flowers, fruits, grain, food, animals, and human beings have been and are still included among the objects acceptable as sacrifices to the deities. It would seem that the simple offerings of fruits, flowers, food, milk, wine, &c., came first in order of time, the more valuable domestic animals, or certain portions of them, later; and lastly, when men took for offerings of the most costly character, human victims are selected and offered.

Among the ancient Greeks and Romans animal sacrifices were very common, the animals being adorned with garlands and selected according to the supposed choice of the deities, each god having his favourite victims. Sometimes the immolation of a heifer showed the wealth or superstition of the offerer. When a solemn lustration was performed at Rome, a sow, sheep, and ox were offered—*auronturilia*; and the same custom obtained in Greece. Both in Greece and Rome the sacrifices were attended with the pouring out of libations and the burning of incense, and they were often connected with the practice of divination. The mythology and actual history of both peoples abound with instances of human sacrifice, and the practice continued openly or in secret down to a very late period. Tacitus has offered up three Persians in sacrifice before

the battle of Salamis, and two of the disloyal soldiers of Julius Caesar were sacrificed to Mars by the priesthood. The ancient Persians also practised sacrifice, but among the followers of Zoroaster the chief offering was that of the sacred *Homā* or the juice of the Soma plant, which the worshippers drank and also cast into the flames of the altar. Among the ruler nations of Northern Europe the custom of human sacrifice prevailed to an immense extent, Scandinavians, Danes, Germans, and Gauls all being in the habit of offering up their prisoners in sacrifice to the gods on the occasion of their great festivals. The people of ancient Mexico, however, seem to take the pre-eminence for this form of iniquity among the nations of the past, their customs, according to the accounts of their conquerors, being positively fiendish in their extent and cruelty. It would be comforting to be able to believe that these records are exaggerated or untrue, but unhappily we find in Dahomey, Ashantee, and some other districts of Africa, at the present day, similar practices of wholesale slaughter, attended also by circumstances of hideous cruelty and revolting cannibalism.

The customs and observances relating to sacrifice occupy a very wide department in the study of religious systems; but it may be observed that in the history of the Israelites, as presented in the Old Testament, we will find references to nearly every phase of its development. Thus, in reference to the primitive belief that the smell of the sacrifice was grateful and pleasing to the deity, we find a tradition preserved in Gen. viii. 21 which speaks of God smelling a sweet smell, and of the sacrifice becoming the occasion of a promise on his part never again to destroy the race by a flood. The custom of sacrifice also is well known to the patriarchs, and the head of a family being at once its priest and ruler, is the person who upon all solemn occasions offers the selected victim upon an altar of earth or stones. Sacrifices are also offered as means of making a covenant with the deity, and just as it was common among Semitic peoples to ratify their solemn treaties by passing between the parts of slaughtered and divided animals, so we have an account of a covenant made with Jehovah in which the deity, under the symbol of a flame of fire, passed between the divided bodies of a heifer, she-goat, and ram (Gen. xv. 9-17). The offerings made include the fruits of the field, the articles of food prepared from these, bread, wine, oil, &c., numerous beasts and birds, and in earlier times, at least, human beings. It has been suggested by many scholars that among the primitive Semitic peoples it was customary to offer the first-born male of every family as a sacrifice to the deities, and for evidence of this fact we are pointed to the substitutionary animals or payments of money sanctioned by the Israelitish law (Exod. xxxiv. 19, 20; Num. iii. 11, 12, &c.), and also to the widely spread practice of circumcision, which they regard as a substitutionary rite. However this may be, and in the present stage of comparative theology it can hardly be decided with certainty, the Old Testament records show that human sacrifice was recognized by all the Canaanitish nations, the Israelites among the rest. Thus, Abraham is represented as receiving without surprise the command to offer his son as a sacrifice; Jephthah, in the fulfilment of a rash vow, offers his daughter in sacrifice to the Lord; Agag is hewn in pieces by the prophet before Jehovah; and in the reign of David a famine is averted by the hanging up before Jehovah of seven of the descendants of Saul. The offering of human sacrifice was a part of the regular worship of Milcom or Molech, which existed contemporaneously with the worship of Jehovah from the time of Solomon to the period immediately preceding the Captivity, the custom of human sacrifice being referred to as one in existence by Jeremiah, Isaiah, Hosea, and others (Jer. vii. 32; xiv. 5; Isa. lvii. 5; Hosea vi. 9; xiii. 2). In 2 Kings iii. 27 we also find an Israelitish defeat, "there came great wrath

upon Israel," ascribed to the offering of a human sacrifice by the King of Moab. In the post-exilian period sacrifice was limited to bloodless offerings and to the offering of clean beasts and birds, every detail of the ceremony being carefully prescribed, and the place of offering being limited entirely to Jerusalem. At the time of Jesus the sacrifices of the Temple were numerous and costly, and they were attended with much elaborate ceremony; but the nation had practically outgrown them, for when the temple was destroyed by the Romans the Jewish religion lived on un-moved and unbroken, and without a sacrifice it has existed ever since.

In Christianity the idea of the necessity for sacrifice is introduced by numerous passages in the New Testament, in which Christ is represented as offering himself as a sacrifice for mankind. To this great offering all the sacrifices of the law are regarded as anticipatory, mere shadows of the substance, the whole of the Epistle to the Hebrews being devoted to the exposition of the way in which the law had been fulfilled and closed by Christ, who had thus formed a new covenant. The sacrifice of Christ has from the earliest times formed one of the central points of Christian theology, though there always have been, and are still, many divergencies of opinion concerning the nature and mode of application of this sacrifice for men. Apart from the sacrifice of Christ, Christianity knows nothing of the rite, and the practice has never found any place in the system of Mohammedanism.

SACRILEGE (Lat. *sacrilegium*) is "the felonious taking of any goods out of any parish church or other church or chapel." Sacrilege was apparently the only felony at common law which deprived the offender of the privilege of sanctuary.

The law of sacrilege now depends on the statute 24 & 25 Vict. c. 96, s. 50, which enacts that "if any person shall break and enter any church, chapel, meeting-house, or other place of divine worship, and commit any felony therein, or being in church, &c., shall commit any felony therein, he shall be guilty of felony." The punishment is penal servitude for life, or for not less than three years, or imprisonment for any term not exceeding three years, with or without hard labour or solitary confinement.

SACRISTAN (Lat. *sacra*, whence the English word sexton) is a church official charged under the priest or ruler of the church with the custody of its appurtenances.

SACRISTY, an apartment attached to a church where are preserved the vestments of the clergy and the sacred objects used in public worship.

SACY, ANTOINE ISAAC SILVESTRE, BARON DE, a distinguished Oriental scholar, was born at Paris, 21st September, 1758. At an early period of life he commenced the study of the Oriental languages, and after mastering Hebrew, Syriac, Aramaic, Samaritan, he devoted himself to Persian and Arabic with such zeal and capacity as to become one of the greatest proficient in these languages that Europe has ever possessed. From the year 1781 he held various appointments under the government, chiefly in the Mint, but he retired from government service in 1792 in order to devote himself exclusively to his favourite studies. In 1785 he was elected a member of the French Academy, and in 1795 he was appointed professor of Arabic at the newly-founded *École des Langues Orientales*. In 1806 he was nominated professor of Persian at the College of France, and two years later he was elected to the Corps Législatif, becoming afterwards a member of the Commission and Council of Public Instruction. In 1822 he became administrator of the College of France, and the same year, in conjunction with the Abbé Rémusat, he founded the *Société Asiatique*. He had been created a Baron in 1813, and in 1832 he entered the Chamber of Peers, being immediately appointed inspector of the Oriental type in the royal printing office, and shortly afterwards

keeper of the Oriental manuscripts in the royal library and perpetual secretary of the *Académie des Inscriptions*. He died at Paris full of years and honours, 21st February, 1838, and was buried in the Père Lachaise. A profound and thorough scholar and a man of immense industry, De Sacy exerted an enormous influence over the study of the Oriental languages in Europe, his work in this respect being perhaps greater than that of any other man of his generation. As a teacher his influence was very great, and many of his pupils afterwards rose to high eminence in Oriental studies, among the foremost being Chézy, Quatremère, Freitag, Renaud, Saint-Martin, Kosgarten, and Rasmussen. It was through his earnest advocacy also that the chairs of Sanskrit, Chinese, and Hindustani were founded in the College of France. Among the more important of his works are his "*Annales de Mirkhond*," a translation with an extensive commentary from the Pers. in (1793); "*Chrestomathie Arabe*" (three vols. 1806-26-27); "*Grammaire Arabe*," one of the foremost works of its kind (two vols. 1810-31); a translation with notes of Abd-Allatif's account of Egypt (1810); "*Mémoires d'Histoire et de Littérature des Orientales*" (1818); and his "*Exposé de la Religion des Druses*" (two vols. 1838). He was also the author of numerous monographs on Oriental subjects, which are preserved in the *Transactions* of the Academy, and in addition to an immense correspondence relating to the subjects of his studies, he contributed over 400 separate papers to the learned journals and reviews of his time.

SAD'DLEBACK, a well known mountain in Cumberland, celebrated in Wordsworth's poetry, and remarkable for its bold and picturesque outline. It is situated $1\frac{1}{2}$ miles north-east of Keswick, and attains an elevation of 2787 feet.

SAD'DLE-TREE is a name sometimes given to the TULIP-TREE on account of the shape of the leaves.

SAD'DUCEES, one of the chief sects of the Jews. See PHARISEES and SADUCEES.

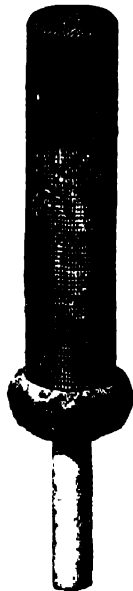
SAD'OWA, a village in Bohemia, about 8 miles N.W. of Koeniggratz, on the road to Gitschin. It is chiefly celebrated as having been the spot at which a decisive battle between the Austrians and Prussians was fought on 3rd July, 1866. The former were commanded by Marshal Benedek, and the latter by the Emperor William. The numbers engaged on both sides were nearly equal—each rather over 200,000 men—but the Prussians had the advantage of being armed with the now celebrated breech-loading needle gun, which was used with most terrible effect. The fight commenced about ten o'clock in the morning, and for a long time the struggle was doubtful, until the army of the Crown Prince of Prussia arrived about half-past twelve, and decided the fate of the day by attacking the Austrians in flank. Being thus partially enclosed between two lines of fire, they were thrown into great confusion, and their array was soon broken and dissolved in precipitate flight; multitudes perished in the morasses, in the waters of the Elbe, and under the wheels of the baggage waggons; but the undaunted attitude of the splendid Austrian cavalry, and the deficiency of the Prussians in that arm, tended very much to mitigate the horrors of the rout. The loss of the Austrians, in killed and wounded, was 17,000, together with 23,000 prisoners, 171 guns, and eleven standards. The Prussians lost altogether about 10,000 men. The battle was one of the greatest and most important that has been fought in modern times, for it was almost immediately followed by a treaty of peace which conferred on Prussia supremacy in Germany, Austria being entirely excluded, and afterwards led to the confederation of North Germany, the deliverance of Venice from Austrian rule, and the establishment of legislative independence in Hungary.

SAFES. See FIRE-PROOF SAFES.

SAFETY LAMP. In the working of coal mines it has been found that when the seams are opened up and exposed to the influence of the atmosphere, large quantities of carburetted hydrogen are given off, and this gas when mixed with common air, in the proportion of about one-tenth of the gas to nine-tenths of common air, becomes a deadly explosive compound known as fire-damp. Of all the dangers to which miners are exposed, that of an explosion is by far the most terrible, and the history of coal-mining contains a list of disasters arising from this cause which have occurred at awfully frequent intervals. Against this terrible danger sundry protective measures have been designed, chief of which are—first, the securing of an effective system of ventilation by which the gas, as it is evolved, is swept harmlessly away; and secondly, the devising of a mode of underground lighting which shall have no power of firing the explosive gas or fire-damp. In the early years of the present century the methods used by miners were of a very inefficient character, and the frequency and terrible fatality of the accidents which occurred led to numerous experiments on the part of inventors for the designing of a lamp that could be carried into mines without risk of explosion. The first place among these investigators was taken by Sir Humphrey Davy, who, working upon his own lines and independently of others, succeeded in designing a safety lamp which, though it failed to give absolute security, yet possessed protective powers far beyond anything that had preceded it. At the outset of his experiments, Sir H. Davy became aware of the fact that fire-damp is the least inflammable of all the known gaseous bodies, and he found that miners who worked in fire-damp were in the habit of using a handkerchief to throw off a stream of brilliant sparks from the fire-damp as a means of illumination, and that in some places they used pieces of glowing charcoal for the same purpose. He found also that while any naked flame would suffice to fire the gas and cause an explosion, when the temperature of a flame was lowered by the interposition

and he pointed out that if by any means the wire gauze was raised above a red heat it ceased to exercise its protective power. He also showed that fire-damp in rapid motion produced much more heat than when it was still, and that a current of air, by raising the red-hot gauze to an approach to white heat, would be the means of igniting fire-damp. He therefore recommended that in the event of a miner encountering a rush or blower of gas he should turn his back to the current and hold the lamp before him so as to screen it from the draught. Subject to these limitations the Davy Lamp possesses a very high protective power, and in spite of the multitude of subsequent inventions, it is still preferred by many practical men.

After the publication of Sir H. Davy's experiments and their result, several persons claimed to have anticipated him in the discovery of the protective power of wire gauze, and it was subsequently proved that in one case at any rate this claim had some foundation, for at the very time he was engaged upon his lamp, George Stephenson, the celebrated engineer, had introduced at the Killingworth mines a lamp made up of a glass cylinder surrounded by wire gauze and fitted with a perforated metallic chimney, air being admitted by a triple circle of small holes at the bottom. This lamp, which is known as the "Geordie," has always been held in favour by miners,



The first Davy-lamp.



Modern Safety-lamp.

of this power, the far cooled in p through this material is to become incapable of igniting a body of gas on the other side. Acting upon this discovery he designed a lamp which was exhibited at the meeting of the Royal Society 11th January, 1816, and which at once came into general use. Briefly described, it consisted of an enclosure of metal surrounded by a cylinder of wire gauze, and fitted with a double top of the same material. He recommended that the aperture in the gauze should not be more than one-twenty-second of an inch square, the wire being not less than one-sixteenth of an inch in thickness. The cage or cylinder should be made of double plating, the gauze folded over so as to leave no aperture, and it should be fastened to the lamp by a screw of four or five turns, and fitted to the screw by a tight ring. All joints should be made with lead solder, and the security depends upon the construction that no aperture exists in the apparatus larger than in the wire gauze. As now made the lamp is fitted with three strong external wires, which meet at the top, and to their point of junction a ring is attached by which the lamp is suspended. When the lamp is lighted and introduced into an atmosphere gradually mixed with fire-damp, the first effect of the fire-damp is to increase the size and length of the flame. When the inflammable gas forms as much as one-twelfth of the volume of the air, the cylinder becomes filled with a feeble blue flame, but the flame of the wick appears burning brightly within the blue flame; and the light of the wick continues till the fire-damp increases to one-sixth, or one-fifth, when it is lost in the somewhat strong flame of the fire-damp; and when the foul air constitutes one-third of the atmosphere, it is no longer fit for respiration.

Sir H. Davy never claimed absolute security for his lamp,

and its use has been retained up to the present day. Another form of lamp, the invention of Dr. Clanny of Sunderland, and called after him the "Clanny," has a glass tube placed outside and around the wire cylinder, and this has also enjoyed considerable favour; but all three forms of lamp are liable to explode the gas when it rappings upon them in the form of a swift current, and the same danger attends almost every modification of the safety lamp that has subsequently been designed.

Some idea of the difficulties to be overcome in the construction of a perfectly safe lamp may be gained from the fact that when, in 1884, a prize of £500 was offered by Mr. Ellis Lever for a new safety lamp—to be perfectly self-contained, which could be conveniently carried by working miners from place to place, which would give a useful light for not less than twelve hours, and which above all should be incapable of causing an explosion of gas under any circumstances likely to occur in actual practice—the judges, after examining 104 oil and 4 electric lamps, were unable to find one that fulfilled the conditions, or that was worthy to take the award. They gave, however, very high commendation to a form of lamp known as the "Marsaut," which has also received the commendation of a royal commission appointed to inquire into the subject, and to another, the invention of Mr. William Morgan of Pontypridd, which they found to present several good features of marked originality. Subsequent experiments have shown that Mr. Morgan's lamp fails to ignite the gas under pres-

saures which are fatal to the Marsaut and most other forms of lamp, and it has gained very high approval from many practical murers to whom it has been submitted.

SAFFLOWER, or *Bastard Saffron*, is obtained from *Carthamus tinctorius*. This plant has been cultivated in Eastern countries from the earliest times, both on account of the oil expressed from its seeds and for the colouring matter procurable from its flowers, which in their dried state, pressed into small cakes, form the safflower of commerce. The oil of the seeds of *Carthamus* was valued by the ancients as a laxative medicine, and is still employed by the Asiatics for the same purpose, as well as for external application. It is most extensively used as a lamp-oil. The plant is, however, chiefly cultivated on account of its flowers, not only in China, India, and Egypt, but also in the south of Europe. The safflower brought from China is the most valued, and fetches a much higher price than that from Bengal. The flowers contain a colouring principle called *carthamin*, which before the introduction of aniline dyes was employed by dyers as the source of some of the more delicate rose colours and the rich scarlet called *ponceau*. It also constitutes the basis of the cosmetic known by the name of *rouge*.

SAFFRON (Arab. *zafran*, from *asfar*, yellow) consists of the dried stigmas of *Crocus sativus*, a plant native of Greece and Asia Minor, but extensively cultivated in Austria, France, Spain, and also formerly in England. The Sicilian saffron is said to be the produce of the *Crocus odoratus*, but both in ancient and modern times this sort has been little esteemed. England is chiefly supplied from France and Spain, that of Spain being preferred. In Germany, however, Spanish saffron is not in such repute as the Austrian, great pains being taken in the cultivation of the plant in that country. When the flowers expand and are thoroughly open under the influence of the sun, the stigmas, of which there are three, are plucked out, a portion of one style remaining attached to them, and spread upon paper, to be dried either by means of portable kilns, over which haircloth or fine sieve is stretched, or in a room by the sun. The stigmas have a penetrating aromatic, and, when in large quantity, stupefying odour, and a bitter aromatic taste; by mastication the mouth and saliva are rendered yellow. By long internal use of them many of the secretions acquire a yellow colour. According to Pereira one grain of good saffron contains the stigmas and styles of nine flowers, hence 4320 flowers are required to yield one ounce of saffron. A single grain of saffron rubbed to a fine powder, with a little sugar, will impart a distinct tint of yellow to 700,000 grains (10 gallons) of water. Saffron was formerly met with in two forms, Hay Saffron and Cake Saffron; the former is now alone in demand, the latter being entirely an artificial compound.

Saffron formerly enjoyed a high repute, both as a perfume and as a nervine, stomachic, and narcotic drug. That the odour has powerfully affected some very susceptible individuals is undeniable; but so little regard is now paid to it that it is employed chiefly as a colouring ingredient or adjunct to other more powerful agents. It was formerly cultivated in Essex, and the town of Saffron-Walden has obtained its name from that cause.

SAFFRON-WALDEN, a market-town of England, in the county of Essex, 45 miles north by east from London by the Great Eastern Railway, near the eastern bank of the Cam. The town is irregularly laid out, and many of the houses are ancient. The church, re-decorated in 1867, is large, and is a very elegant specimen of the later Perpendicular style of architecture. The town-hall is a neat building in the market-place. There are a brewery, rope-work, iron-foundry, and steam flour-mill. The Gibson Hospital, for twenty-six patients, was erected in 1866, besides which there is an agricultural hall, a museum, a lecture hall, horticultural society, young men's

society, and almshouses for twenty poor people. In the vicinity is Audley End, the fine seat of Lord Braybrooke. Saffron-Walden is a municipal borough, and is governed by four aldermen and twelve councillors. The population in 1881 was 6056. Saffron-Walden derives its name from the Saxon words *weald* and *den*—the wooded hill—and the quantities of saffron formerly grown in its vicinity. A castle was built here by Geoffrey de Mandeville soon after the Norman Conquest, of which only a portion of the keep remains. But the *Pell* or *Upel Dutches*, a British encampment, show that its commanding position had previously been rendered available for military purposes.

SAFFRANIN or **SAFFRON YELLOW**, a coloring matter obtained from saffron, *Crocus sativus*, natural order Iridaceæ. It is a red powder, soluble in water and alcohol, forming intense yellow solutions. Strong sulphuric acid colours it blue.

SAFFRANINE, a fine red dye prepared commercially by heating aniline nitrate for a short time with arsenic acid to 120° C. (248° Fahr.), dissolving the product in boiling water, neutralizing it with lime, and precipitating the base as hydrochloride by common salt. Its salts are of a red colour, crystallize well, and lose a portion of their acid by repeated crystallization from water. The most characteristic reaction of saffranine is that when strong sulphuric acid is gradually added to its solutions the colour changes first to a fine violet, and then successively to blue, dark green, and light green. It comes into commerce as a brown-red powder, which is the hydrochloride of the base, the formula of which is $C_{14}H_{12}N_2$. It dyes silk and wool directly, but cotton requires a mordant.

SAGA, an old Norse word, now employed to denote a poem or tale which has been grounded on old tradition, and gradually moulded into a written form. The Norwegian Teutonic literature, which has of late years engaged the attention of scholars, is almost wholly composed of these semi-mythical semi-historical sagas, the principal of which are "Luthjofs Saga" and "Volunga Saga" (the Norse form of the Nibelungenlied), both Icelandic, "Jomsvinga" and "Knytinga" sagas (Danish), "Ingvars Saga" (Swedish) and "Eymund's Saga" (Russian). They belong from the north to the thirteenth century.

SAGAPENUM, a substance yielded, according to Willdenow, by *Lordia persica*, which grows in Persia and other regions of the East. It is procured in the same manner as asphaltum, and occurs either in tears or angular pieces of a dirty brownish colour, containing in the interior of yellowish grains. It is difficult to break unless very old, is tenacious, and not easily powdered, except in water. Sagapenum has the same alkaline odour as asphaltum, but is less powerful, with a more bitter and acid taste. It consists chiefly of resin, gum, and oil. Its action on the human system is the same as that of asphaltum and other fetid gum-resins. See ASALTUM.

SAGE (*Salvia*), a genus of plants whose species are well known both as ornamental shrubs and on account of their uses in domestic economy. That which is used most frequently in this country is the Garden Sage (*Salvia officinalis*). It is a native of various parts of the south of Europe. It is much employed in cookery, and is supposed to assist the stomach in digesting fat and luscious kinds of food. Sage-tea is commended as a stomachic and slight stimulant; sage has also tonic and astringent properties. The Latin name *Salvia* (from *salvare*, to save) shows in what favour it was held for its medicinal virtues. The school of Salerno recommended it for all diseases, and even used to say of it: "Cur moritur homo cum *salvia* crescit in horto?" (Why should a man die while he has sage in his garden?) It is a struggling, half-shrubby plant, with oblong leaves of a dull brownish green colour; the flowers are usually blue in distinct whorls. The Apple-bearing Sage (*Salvia pomifera*) is a native of the rough

open hills in Crete and various parts of the Levant. It is remarkable for being liable to the attacks of an insect of the *Cynips* genus, which produces upon its branches little protuberances similar to galls upon the oak, but much larger. These morbid growths contain an acid aromatic juice, and on this account are valued by the inhabitants of Crete as an article of diet. Clary (*Salvia Sclarea*) is a native of the south of Europe and the East, and is one of the longest known of the exotic herbs found in British gardens, having been introduced in 1562. It is sometimes used for making wine, which has a taste resembling that of Frontignac, and is remarkable for its narcotic qualities. *Salvia splendens*, *Salvia fulgens*, and *Salvia coccinea* are all handsome ornamental flowers, and largely cultivated.

The genus *Salvia* contains more than 400 species, distributed over nearly all parts of the world. It is chiefly known by the peculiarity of the stamens, in which the anther cells are separated by a long flat connective, one producing pollen, while the other is deformed and abortive.

The SAGE BRUSHES of the western states of America are various species of *ARTIMISIA*.

SAGERETIA is a genus of plants of the order RHAMNACEÆ. The species are found in both South and North America, Java, China, and in India along the foot of the Himalayas. They are shrubs with slender thorny branches, sometimes half-climbering, with leathery toothed leaves, and small flowers arranged in spikes. The only species requiring particular notice is *Sageretia theezans*, which is remarkable as being employed as a substitute for tea, even in China, where the plant is described as making use of the leaves in the same manner as those of the true tea, and for which it makes a good substitute, from its astringency and fragrance.

SAGHA LIEN (*Sakhalin*, *Krafla*, or *Tarake*), a long, narrow, and irregularly-shaped island off the east coast of Asia, with an estimated area of 25,000 square miles. It is separated from the mainland by the Gulfs of Tutuy and Amur, and from Yesso, on the south, by the Strait of La Perouse. The northern part of Saghalien formerly belonged to the Russians, and the southern to the Japanese, but in 1875 the whole was ceded to Russia. A garrison of 600 men is maintained at Ditr, which is the principal settlement. In winter the sea is frozen over for the space of four months, and then the passage to Siberia is effected by sledges drawn by dogs. The island is chiefly valuable on account of its rich coal-mines, and its possession is of importance to Russia, as it commands and protects the mouth of the river Amur and also the Sea of Okhotsk. The inhabitants carry on a considerable fur-trade with fish, furs, and seals.

SAGITTA is a remarkable genus of worms, occupying an isolated position, though presenting some analogies with the NEMATOIDEÆ. It is placed in a separate class, Chaetognathæ. Several species are known, all small marine animals, frequently swimming at the surface of the sea in all parts of the world. The body is about an inch long, it is elongated, somewhat cylindrical, and unsegmented. It is colored at one end into a rounded head, and along the sides and around the tail runs a membranous fin supported by fin-rays. Near the mouth are two lateral groups of hooks which serve as jaws. The alimentary canal is simple and straight, attached to the body-wall by two mesenteries, and opens at the base of the tail. Vascular and excretory organs are absent. The nervous system consists of a large ventral ganglion placed about the middle of the body, and connected by commissures with a cerebral ganglion, on which the eyes are situated. Sagitta is hermaphrodite; both female and male genital organs are paired, and lie near the tail, the former in front of the latter. In the development of the egg the body cavity is formed by the ripping off of two lateral pouches of the primitive digestive cavity (archenteron) of the diblastula.

SAGITTA'RIA. See ARROW-HEAD.

SA'GO, a word signifying, in the language of the Papuas, bread, since it constitutes the staple article of food of the inhabitants of the Eastern Archipelago and other parts where the plants which yield it grow. It is not a seed, as sometimes supposed, but the farina from the stem of several palms and palm-like vegetables, the chief of which are the *Sagus Rumphii*, *Sagus laevis*, *Saguerus Rumphii*, *Phoenix farinifera*, *Corypha umbraculifera*, some cycases, and even a zamia; but these last yield a very inferior sort. The *Sagus laevis*, from which the finest sago is prepared, forms immense forests in nearly all the Moluccas. The seeds of *Dolichos Chinensis* are used in North America for bread; and a starch procured from the tubers of the *Ipomœa Batatas* is beaten up with the farina of the *Euterpe caribœa* into sago in the West Indies. Sago is a variety of starch, prepared by the plant for the use of the flowers and fruit, and most abundant just before the appearance of the spadix or flower-bud. At this time the stem is cut down near the base, and then divided into pieces of two to five feet in length. The pulp is put into a trough, mixed with water, and beaten with a piece of wood; the fibres, being then separated from the pulp, float at the top, and the flour subsides. The clear water is poured off, and the deposit dried. This is the sago flour of commerce.

The quantity yielded by one tree is prodigious. Five or six hundred pounds are not an unusual produce; and as the vegetation still remains after being felled, a stem again springs up, which goes through the different stages of growth till it is fit for the axe.

Sago flour is imported for use as starch in the preparation of calico, &c. Granulated sago is the state in which it is commonly brought to Europe for use as food. To produce this from the flour it must be moistened and passed through a sieve into a shallow iron pot held over a fire, which enables it to assume a globular form. Thus all our grained sago is half baked, and will keep long. Of this granulated sago there are two varieties, the common or brown and pearl sago. The latter is in small hard horny or semitransparent grains, about the size of a pin's head; the former are in larger grains, about the size of pearl barley. Of late years the Chinese have invented a process for refining sago and giving it a fine pearly lustre. This article is in high estimation in all the European markets, and forms a light, wholesome, and nutritious food. Sago was formerly employed to some extent in the adulteration of sugar.

Sago is sent from the islands where it is grown to Singapore, where it is granulated and bleached by the Chinese, and from whence nearly all the sago used in this country is imported. The quantity received is nearly 300,000 cwt. per annum. The price averages from 11s. to 16s. per cwt.

SAGOU'IN. See SQUIRREL MONKEY.

SAGUN'TUM, the modern *Murriedro*, was a town of ancient Spain or Hispania, south of the Iberus (Ebro), standing on a hill 3 miles from the sea-coast. Being south of the Iberus, it was in native territory; nevertheless it allied itself with the Romans, masters of the north, and when Hannibal besieged it (B.C. 219) Rome, under pretext of this alliance, began the Second Punic War. Hannibal had to besiege it with all his powers for eight months before the city fell. Saguntum was always considered by the ancients to be a colony from the Greek island Zakynthos (now Zante), to which the name would give great support; the letters *s* and *z* freely interchanging, as with ourselves; indeed the one sign often serves for the two sounds (compare *this* and *these*).

SAHARA or **SAHRA** ("Desert without water," according to the full Arabic name) is a country of immense extent, which occupies the central parts of Northern Africa. Its western extremity is washed by the Atlantic,

along which it extends from Cape Nun, $28^{\circ} 46'$ N. lat., to the mouth of the river Senegal, 17° N. lat. The valley of the Nile constitutes its eastern boundary. The Sahara thus extends from 32° E. to 17° W. lon., or for about 2650 miles. The northern and southern boundaries are rather imperfectly defined, but it is generally recognized that on the north it reaches to the base of the Atlas Mountains, and at one part, between 17° and 19° E. lon., even to the shores of the Mediterranean. The southern boundary is best known towards the Atlantic, where it extends to the vicinity of the river Senegal, and between 15° and 4° W. lon. approaches the parallel of 15° N. lat. The average width from north to south is about 1000 miles. The area is more than 2,500,000 square miles.

The Sahara is a desert, the greater part of which consists of a firm soil, in many places composed of indurated sand, in others of sandstone. The surface of other tracts consists of rocks, especially granite, frequently mixed with quartz; while the rest is covered with a thick layer of fine loose sand. The lower depressions, however, contain a few wells, in the vicinity of which the soil is covered with grass and bushes that afford pasture to camels, goats, and sheep. The wells of drinkable water occur only at a distance of ten days' journey from each other, and sometimes the distance is even greater, so that travellers have been known to undergo the most intense suffering from thirst, in addition to their other difficulties. In those tracts which are covered with fine loose sand, the whirlwinds often blow with great force, raising a large portion of the sand to a considerable height and depositing it again at some distance. Such pillars of sand have buried many caravans, and sometimes render the sun hardly perceptible.

There is, however, a tract across the desert in which these dangers are comparatively small. It lies between 13° and 16° E. lon., and owes its advantages partly to its climate and partly to its soil. It is remarkable that this tract occurs where no elevated country lies between the Mediterranean and the Sahara; at this spot the northern winds, which frequently blow a gale and bring moisture from the countries north of the Mediterranean, find access to the desert, and produce a considerable degree of cold even as far south as Mourzuk. To these winds also may probably be ascribed the rain which falls in this season in the kingdom of Fezzan, and renders it the most fertile portion of the Sahara.

The tract just noticed as traversing the desert from north to south, divides it into two unequal portions, of which the western and larger is known among the natives by the name of Sahel, and the eastern and smaller among geographers as the Libyan Desert.

The coast of the Sahara extends more than 1200 miles along the Atlantic. The whole coast as far south as Cape Blanco is free from sandbanks and shoals, and has regular soundings. The depth gradually increases from the beach, and at the distance of 4 miles there are from 30 to 34 fathoms; at 12 miles, from 50 to 60 fathoms; and at the distance of 30 miles, about 100 fathoms. The water then deepens very suddenly. A large sandbank, however, extends from Greyhound Bay (21° N. lat.) to Cape Mirik; it is known by the name of the Bank of Arguin.

At the extreme north-west of the desert—some 800 miles in a direct line from Timbuktu—the slightly-elevated coast-line is pierced by the river Belta. This point is almost directly opposite the Canary Isles, and engineers have pronounced it practicable to clear the accumulated sands from the mouth of the river, and to carry the opening through the low hills behind, so that the waters of the Atlantic may flow into the low levels of the Sahara. These constitute the great depression known as the El Juf, are said to comprise an area of 126,000 square miles, and were at one time, beyond question, covered by the waves of an inland sea.

The country along the coast, although barren in the extreme, is far from being entirely destitute of inhabitants, as they always make their appearance when a vessel approaches or is cast on the shore. At no great distance from the sea there are extensive pasture grounds, though they are of very inferior quality, and frequently interrupted by districts which are completely sterile. Further inland desert tracts, entirely destitute of vegetation and inhabitants, occupy a much greater portion of the country. The Libyan Desert, or eastern part of the Sahara, contains a considerable number of oases or fertile spots, which support a moderate population.

No rain falls along the coast south of Cape Juby; but there are some annual showers between August and November in the countries south of the Atlas Mountains. Along the coast heavy dews occur in the summer months, but both dew and rain are almost unknown in the interior, where the wind nearly always blows from the east, and in the daytime frequently with the violence of a gale, which, however, is generally followed by a dead calm after sunset. The strong wind moderates the heat of the burning sun, and hence the nights are sometimes more insupportable than the days. Rain appears to fall in torrents over the desert at intervals of five, ten, or twenty years. The degree of heat to which these countries are subject has not been determined by exact observation: the highest temperature recorded is 110° Fahr. Notwithstanding this excessive heat in summer, the evenings are cool and the nights frequently cold in the winter.

The most useful domestic animal in this country is the camel, without which these extensive deserts could not be traversed. The goat is very abundant in the Sahel, as the dry pastures are more adapted to it than to sheep. The latter, however, are also common. There are some black cattle of a small breed, but only in those places which have good pasture. Horses are rare in the Sahel, but further east they are numerous. There are lions and panthers, and some other smaller wild animals. Gazelles are frequent wherever bushes and shrubs occur, and in a few places antelopes are also met with. In the deserts bordering on Egypt the *dipsos proba* abounds. In the Sahel ostriches are very numerous, and they are hunted by the natives for their feathers. Vultures, ravens, snakes, wild ducks, and Guinea fowl are met with. There are also serpents in large numbers.

The vegetable productions are necessarily very few. Date trees are only found in the cases of the eastern districts and at the foot of the Atlas range, and palms grow on the borders of the desert. Tibboos, a native tribe of the Libyan Desert, cultivate a species of millet and a little cotton. Among the wild plants there are some species of *munos*, *acacias*, and a thorny plant which affords food to the camel. Near the most south-western corner of the Sahel extensive woods of *acacia* trees flourish, from which by far the greatest part of the gum is obtained which in Europe is consumed under the name of gum-arabic. It is collected by the Moors, and then sold to the French and English merchants in St. Louis on the banks of the Senegal River. The minerals are limited to iron ore and salt.

A great number of independent tribes are dispersed over the Sahara, who belong to four nations—the Moors, the Tuaricks, Tibboos, and Arabs—and are believed to number altogether about 1,000,000. They profess the Mohammedan faith. The Moors seem to be in possession of the whole country west of the road leading from Timbuktu to Cairo; and they partake of the characteristics both of the pure Moor and of the negro. The Tuaricks occupy the centre of the Sahara; they belong to the aboriginal inhabitants of Northern Africa, who are known by the name of Berbers, and in Morocco are called the Amazirghs. The Tibboos occupy the tract between Fezzan and Lake Tchad, and an extensive country extending east of this line towards the

boundary of Egypt. In features they strongly resemble the negroes. The Arab tribes dwell along the boundary line of Egypt and Nubia.

Though the Sahara only supplies three commercial products, salt, gum-arabic, and ostrich feathers, a considerable traffic is carried on between the countries north and south of the desert, which is frequently traversed by caravans or caravans consisting of from 200 to 500 persons, and from 500 to 2000 camels. A camel's load is 500 lbs. The caravans take from the countries situated on the Mediterranean chiefly goods of European manufacture, such as fire-arms, gunpowder, and some cotton stuffs, to which are added some articles manufactured at Fez, and tobacco, dates, &c. Their returns consist of gold, ostrich feathers, and ivory. In traversing the desert they usually buy large quantities of salt, which they sell in the Soudan at a great profit. One of the caravan routes is from Tripoli to Bornou, and another from Fez to Timbuktu; there are three or four others of minor importance.

The Greeks and Romans were acquainted with portions only of the northern and eastern margins of the Sahara. The coast of the Sahara was discovered by the Portuguese between 1412 and 1443, but the interior was nearly unknown up to the end of the eighteenth century. Within the present century various African travellers have greatly extended our knowledge of this region.

SAHARANPUR, a municipality and the administrative headquarters of Saharanpur district, North-western Provinces, British India. It is situated on both sides of the Dehra Doon Railway, and the headquarters of the Juma Caid estate, Saharanpur. It is a well-built town, with many brick houses. It is an important government betwined gardens, which have proved useful in promoting the acclimatization of valuable plants. There is a handsome mosque for the Mahomedan community, who form a very influential body, and a considerable number of Walis. There is an English church, and a mission of the American Presbyterian Church. Saharanpur is also the headquarters of the Juma Caid estate.

(Malaria) which crowd the town at the beginning and end of the hot season. Malaria diseases prevail, owing to the neighbourhood of a swamp; but draining operations have been carried out. It is a great trade in grain, sugar, molasses, and country cloth. Population, 15,000.

SAHLITE, a grayish-green mineral closely allied to Atchite, and so called from its occurrence near Sahle Sweden.

SAIGA (*Saiga tatarica*) is a species of ANTILOPE found in Eastern Europe and Western Asia inhabiting open steppe and deserts. It is the size of a goat, with a long, thin, yellowish snout and light gray in winter. The horns, which are found only in the males, are only a few inches long, and set at right angles to the snout, and slightly curved on their axes. The saiga is gregarious, many thousands being together and migrating southwards in winter to the Caspian Sea. Its speed is great at the first start, but it is not long sustained. The skin is much hunted for the sake of its pores, and for its skin, that of the young is employed in the manufacture of gloves.

SAIGON, a municipality, a river port, and the capital of the French colony of Lower Cochinchina, is situated on the right or west bank of the river of the same name, 34 miles from its mouth in the China Sea. Its population is estimated at 70,000, including many Chinese.

The city, which is one of the best river ports in Asia, consists of two towns, connected by a straggling suburb with the citadel, on the west side of the river. Numerous buildings in European style have been erected by the French, including a citadel, arsenal, and naval storeroom. Of the old Chinese town on both banks of the river little remains except the ruins of an old citadel. In its place a new town has sprung up on the right bank of the

river. The chief export is rice. Trade is mainly in the hands of the Chinese. Saigon communicates with the Cambodia by a canal, 50 miles in length. It was taken by the allied French and Spanish troops in 1860, when it was made a free port, and telegraph lines were laid through the province. By the treaty of 1864 the whole of Cambodia is placed under the protection of France.

The colony of which Saigon is the capital comprises the provinces of Dong-Nai, Bienhoa, and Saigon, or that portion of Lower Cochinchina extending east of the Cambodia to the small river Kumi, 85 miles in a direct line, and north on the Cambodia to 11° 10' N. lat., 130 miles along the course of the river. Since its occupation by the French good roads have been made, and the resources of the colony very much developed. It is watered by many large streams besides those already named, and the soil is extremely fertile. The climate is hot and humid; the coasts are very much indented with deep bays; and an extensive trade is carried on. The population of the whole district in 1881 was stated to be about 1,600,000. Many European, as well as Chinese, ships are engaged in the commerce of this country—the principal articles of exportation being rice, dried fish, cocoa-nut oil, buffalo hides and horns, mats, Annam nuts, cotton, calico, sugar, tobacco, and silk. See COCHIN-CHINA.

SAILING, or the **SAILINGS**, a term applied to the different ways in which the path of a ship at sea and the variations of its geographical positions are represented on paper. It is also applied occasionally to the rules by which, in particular circumstances, a ship's place is computed.

Pione Sailing, Parallel Sailing, Middle Latitude Sailing, and Mercator's Sailing have been briefly explained under **RECKONING AT SEA**; and *Tangent Sailing* or **GREAT CIRCLE SAILING**, is dealt with in the special article of that name.

SAILS AND RIGGING. Under this heading we shall include the sails, the masts, &c., which sustain them, and the ropes which move the sails and which support the masts. The word "ropes" is highly un-nautical; an old seaman will growl out, if such an expression be used in his hearing, "There's only one rope in a ship, and that's the bell-rope." *Sheets, tacks, stays, lutes*, &c., are some of the denominations of ropes, distinguishing them by their use.

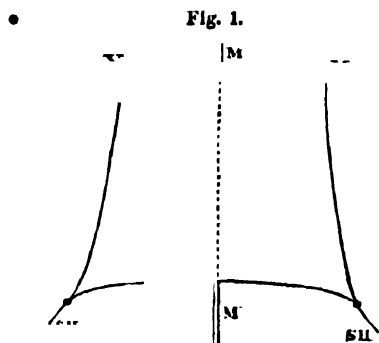
Masts and Bowsprit.—The masts are not usually fixed vertically in the ship. The *rule* of a mast is its inclination to the vertical, forward or aft. The only masts which rake forward are the foremasts of vessels of what is called the "lateen rig"; and in them the rake ranges from one-fifth to one-third of the length. In all other cases the rake of masts, if any, is aft, and is commonly greatest in the smallest vessels. The chief use of making the masts rake aft seems to be to obtain a position more advantageous to the strength of the rigging than the vertical position.

The *steerer* of the bowsprit is its slope upwards. It enables the inboard part of the bowsprit to be securely fastened, and to keep the outboard part clear of the waves.

Sails.—All sails are divided into two principal classes—*square-sails* and *fore-and-aft sails*. Square sails are those whose middle position is transverse or athwartships, and which can be braced to a greater or less angle on either side of that position to suit the direction of the wind, but cannot be braced exactly fore-and-aft. Fore-and-aft sails are those whose middle position is longitudinal, or fore-and-aft, and which can be trimmed to a greater or less angle to either side of that position, but not directly athwartships. Square-sails are the most efficient for running large, or away from the wind, or before the wind; fore-and-aft sails are the best for running near the wind, and for manoeuvring; and for certain manoeuvres they are essential; hence, although some small vessels are wholly without square-sails, none are wholly without fore-and-aft sails. Vessels are said to be *square rigged* or *fore-and-aft rigged*,

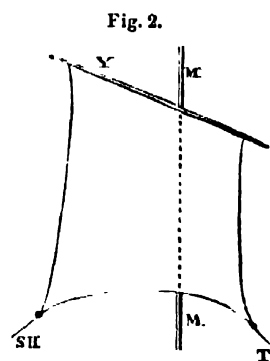
according as their principal sails are square or fore-and-aft.

Square-sails (with the exception of studding-sails, to be described further on) are of one kind of figure, like that shown in fig. 1; that is to say, it is four-sided and sym-

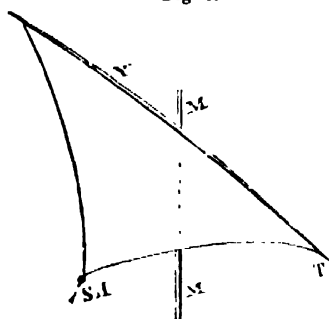


Square-sail.

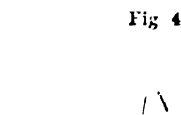
metrical at each side of an upright centre line, *M M*, which line, in the figure, also represents the mast. The upper



Lug-sail.



Lateen-sail.



Sprit-sail.

Fig. 2 is a *lug-sail*, hanging from a yard, which is slung at about two-thirds of its length from the peak. A *gaff-top-sail* may be regarded as a lug-sail with a narrow head. Fig. 3 is a *lateen-sail*, bent to a *lateen-yard*. A *settee-sail* is intermediate in shape between a lug-sail and a lateen-sail, having a weather-leech of small height. Fig. 4 is a *sprit-sail*, bent to the mast at the weather-leech,

edge, or *head*, and lower edge, or *foot*, are parallel to each other; the two side edges, called *leeches*, are of equal length. The head is bent to, and hangs from a transverse spar, *Y Y*, called a *yard*. The two lower corners, called *clews*, are stretched by means of ropes called *sheets*, *SU*, *SU*.

Fore-and-aft sails are of irregular figure, some three-cornered, some four-cornered. Some are bent to yards, some directly to the mast, and some to sloping ropes called *stays*. The highest corner of a fore-and aft sail always points aft, and in four-cornered sails is called the *peak* of the sail. The word *peak* is also applied to the end of the yard, sprit, or gaff to which the peak of the sail is bent. The upper forward corner is called the *throat* or *neck*. The lower aft corner is called the *clew*, the lower forward corner the *tack*; the clew is hauled aft by a rope called the *sheet* (*SU*, figs. 2-8), and the tack hauled forward by a rope, also called the *tack* (*T*, figs. 2-8). In a fore-and-aft sail the *head* is the upper edge, if the sail is four-cornered, or the upper corner, if the sail is three-cornered; the *foot* is the lower edge; the foremost edge is called the *luff* or *weather-leech*, the aftermost edge is called the *lee-leech*, or simply the *leech*. Figs. 2, 3, 4, 5, and 6 are examples of fore-and-aft sails which hang from spars. *M M* in each figure is the mast.

Fig. 6.

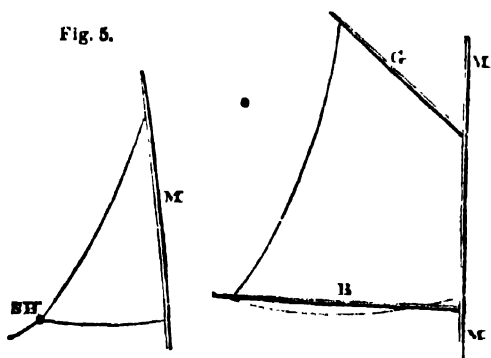
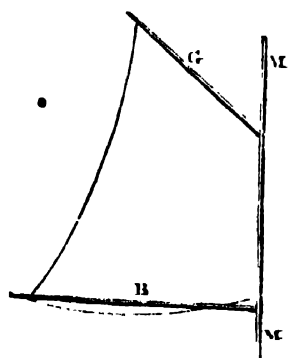


Fig. 5.

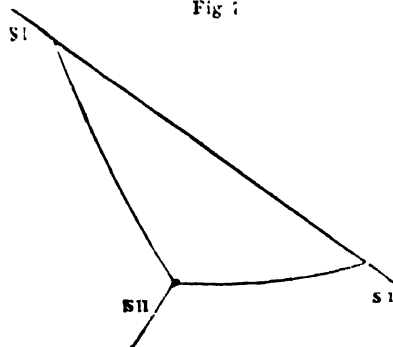


and having the peak stretched and held up by a raking spar called a *sprit*, *ST*. Fig. 5 is a *shoulder-of-mutton sail*, being a triangular sail with the weather-leech bent to the mast. The mast, to carry this sort of sail, is sometimes lengthened by means of a movable piece called a *sliding-gunter*. Fig. 6 is one of the most useful forms of

fore-and-aft sails, being a four-cornered sail bent at the weather-leech to the mast, and at the head to the *gaff*, *G*. The foot of the sail is stretched sometimes by a *boom*, *B*, and sometimes simply by a sheet. Sails of this form have different names, according to their situation and use, such as *gaff-mainsail*, *gaff-foresail*, *spanker* or *driver*, *spencer*, *trysail*, of which the special application will be afterwards shown.

Figs. 7 and 8 are examples of sails bent to stay-ropes:

Fig. 7.



Jib or Stay-sail.

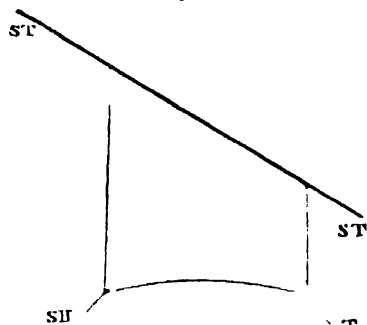
when three-cornered, as in fig. 7, the sail is called a *jib* or a *stay-sail*, according to its position. Fig. 8 is a four-cornered stay-sail.

Booms, such as *B*, fig. 6, are sometimes used to stretch

the foot of sprit-sails and lug-sails, as well as of gaff-sails.

Fore-and-aft sails bent to yards which hang across the mast, such as lug-sails and lateen-sails, are suited to boats and small vessels only; because, when the vessel goes about,

Fig. 8.



Four-cornered Stay sail.

it is necessary to shift the sail to the lee side of the mast, which with large and heavy sails is a difficult operation.

The weather-leech of a fore-and-aft sail which is bent to a mast or to a stay, usually hangs to a series of *hooks or hanks*, which run on the mast or stay to enable the sail to be hoisted or lowered.

Studding-sails.—These are names for additional sails spread by the aid of light booms and yards beyond the edges of the principal sails, to increase the area of canvas caught by the wind. All of them are four-sided. Studding-sails are added at one or both leechees of a square-sail; a *boom* is added below the foot of the principal sail, to which it is hoisted; the *ringtail* is spread at the lee-leech of the driver, or aftermost fore-and-aft sail. Studding-sails are not used on a mizzenmast, because the braces of the yards on that mast are led forward, and give no assistance in resisting the forward pressure of the wind.

Order of Square sails on a Mast.—The square-sails spread on the successive divisions of a mast have names corresponding, with a few exceptions, to the names of those divisions. On a lower mast a square-sail is called a *course*; and on the higher divisions, successively a *top-sail*, a *top-gallant-sail*, and a *royal*. The royals are the highest sails commonly spread; but in very light airs small square-sails are sometimes hoisted above them, called *sky-sails*, or *sky-scrapers*, or *flying kites*. The yards to which these sails are bent have corresponding names.

Reefing consists in taking in part of a sail, so as to reduce its area, and is applied to courses and other lower sails, whether square or fore-and-aft, and to square topsails. Square sails are usually reefed at the head, fore-and-aft sails at the foot. When a topsail is *clow-reefed*, its depth is reduced to about one-half.

Styles of Rig.—The nomenclature between square-rigged and fore-and-aft rigged vessels has been explained above. The other differences among styles of rig depend chiefly on the number of parts into which the whole area of sail is divided.

If efficiency in propelling the vessel were the only thing to be considered, the best style of rig would be that containing the fewest and the largest sails. But the difficulty of working very large sails and spars renders it necessary to subdivide the area of sail into parts, which are the more numerous the larger the vessel and the fewer the crew. The simplest styles of rig are fore-and-aft, because fore-and-aft sails are essential to every vessel. In the more complex styles of rig square-sails predominate, chiefly because the fact of their being balanced upon the mast makes them comparatively easy to work.

Rig of Boats.—Open boats are always fore-and-aft rigged, with one, two, or three movable masts, and with or without a running bowsprit. They have seldom or never topsails, or other upper sails. Each mast carries a fore-and-aft sail of one or other of the kinds represented in figs. 2, 3, 4, 5, and 6; these are called in their order, from the head, the *fore-sail*, *main-sail*, and *mizzen or driver*; and when there is a bowsprit, a *jib* is carried on a stay between

Fig. 9.



Fig. 10.



it and the foremast. When there is a driver, its clew is usually hauled out to a *boom or outrigger*, projecting over the stern. For example, fig. 9 represents a gig about 20 feet long, with a single lug-sail; fig. 10, a boat about 32 feet long, with a jib and three sprit-sails—fore, main, and mizzen.

A *Lugger* is a small decked vessel equipped chiefly with the lug-sails already described, and represented in fig. 2. The masts are usually three in number—mizzen, main, and fore—with a running or movable bowsprit. Sometimes all three masts have separate topmasts carrying lug-topsails; sometimes the mainmast only is so fitted.

Fig. 11.

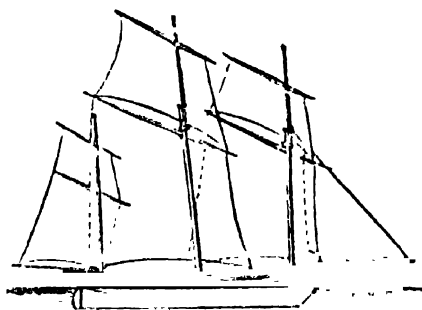


Fig. 11 represents a three-masted lugger, carrying a jib, three lug-sails (fore, main, and mizzen or driver), and three lug-topsails.

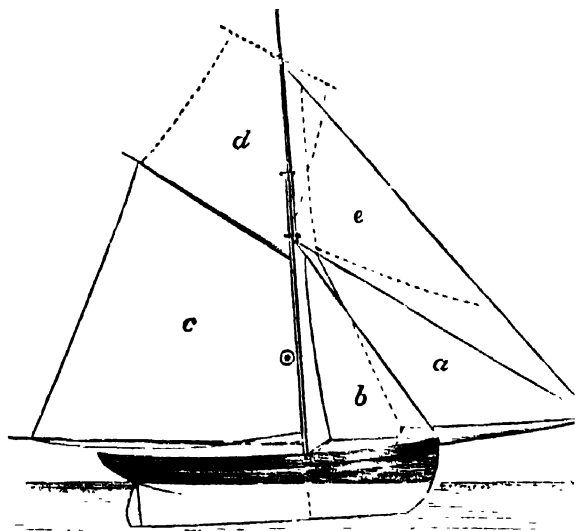
The Chinese *junk* may be regarded as a modification of the lugger. The sails are stiffened transversely at intervals by bamboos, fixed to travellers or hoops that run upon the mast.

Lateen-rigged vessels (used chiefly in the Mediterranean) are equipped wholly or chiefly with lateen-sails, such as those shown in fig. 3. They have one, two, or three masts, and are called by a variety of names, those most commonly used in English being *felucca* for one-masted, *galley* for two-masted, and *zebec* for three-masted vessels. The lateen-rig is sometimes combined with the square rig, in various ways. It is as simple as the lugger rig, but it has not the same advantage as to spread of sail, and presents similar inconveniences in going about.

A *Cutter* (sometimes called, in the merchant service, a *sloop or smack*) is a one-masted vessel, whose general style of rig is shown in fig. 12, *a* being the *jib*, set between the foremast and a running bowsprit; *b*, the *foresail*, which is a triangular stay-sail; *c*, the *main-sail*, which is a gaff-sail, hanging from the gaff, and having its weather-leech bent to hoops on the mast; its clew is hauled out to the end of a boom. The mark © shows the centre of effort for the three sails before-mentioned. The *gaff-topsail*, *d*, marked

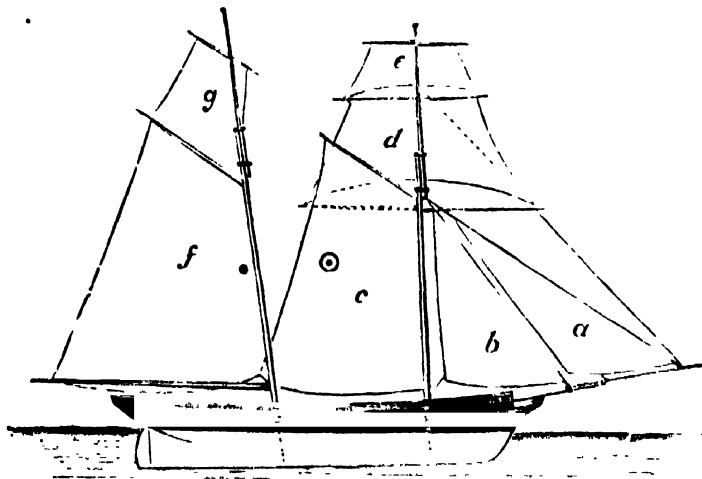
by dotted lines, is bent either to a short gaff, or to a yard like that of a lug-sail, which is hoisted on a pole topmast. In addition to the before-mentioned sails a cutter is often provided with a *balloon-jib* or *jib top-sail* (*e*) being a triangular sail hauled up to the topmast head, and with a *square-sail*, a *square top-sail*, and sometimes a *square*

Fig. 12.



topgallant-sail, for running before the wind. The yard of the square-sail is called the *cross jack-yard* (cro' jack-yard), and the foot of that sail is often spread by means of a boom. The cutter-rig is the most favourable of all to the efficiency of the sails, especially in sailing near the wind, and in manœuvring; but the great size of the main-sail makes it impracticable to use it in large vessels; and in battle, or in a violent storm, its having only one mast exposes the vessel to too great a risk of being disabled.

Fig. 13.



A *Yawl* or *Dandy* has a mainmast and a running bowsprit with sails like those of a cutter; and in addition, there is a small mizzenmast at the transom, rigged with a lug-sail or gaff-sail. The object of the yawl rig is to lighten the main-sail and its boom. It is much used for yachts.

A *Schooner* is a fore-and-aft-rigged vessel, with two masts, fore and main, or three masts, fore, main, and

mizzen. The bowsprit is either a running bowsprit in one piece, or a small standing bowsprit with a jib-boom. Each of the masts has a topmast, like that of a cutter. On the lower masts are spread gaff-sails, like a cutter's main-sail; but in general the aftermost of those alone (main-sail when there are two masts, driver when there are three) has

a boom. The main-top-sail and the mizzen-top-sail (if any) are gaff-top-sails, the fore-top-sail and fore-topgallant-sail are usually square; and sometimes there is a square fore-sail, like that of a cutter. A jib top-sail may be set on the fore-topmast stay, which runs from the fore-topmast head to the jib-boom end; and a maintopmast stay-sail on the maintopmast stay, which runs from the maintopmast head to the cap of the foremast. Sometimes the mainmast has a square-sail, top-sail, and topgallant-sail.

Fig. 13 shows the principal sails of a two-masted schooner, *a* being the jib; *b*, the fore-staysail; *c*, the fore-sail; *d*, the square fore-topgallant-sail; *e*, the square fore-topgallant-sail; *f*, the main-sail; *g*, the main-gaff-top-sail.

The three-masted schooner-rig spreads a proportionally greater area of sail than any other, being in some examples nearly five times the area of the lead-water section.

A *Brig* is a two-masted, square-rigged vessel, each of the two masts having all the square-sails previously specified. There is a standing bowsprit, with a jib-boom and

flying jib boom.

Besides the square-sails and the fore-and-aft sails on the bowsprit, a brig has also a large *gaff-mainsail*, called sometimes the *driver*, and a gaff-sail on the foremast, called the *fore-trysail*.

Fig. 14 shows the principal sails of a brig: *a* being the jib; *b*, the fore-sail or fore-course; *c*, the fore-top-sail; *d*, the fore-topgallant-sail; *e*, the main-course; *f*, the main-top-sail; *g*, the main-topgallant-sail; *h*, the driver.

These are the sails usually taken into account in finding the centre of effort, which is marked thus, ⊙; the fore and main *royals*, which may or may not be included in that calculation, are shown by dotted lines above the topgallant-sails. The upper sails and spars of the two masts of a brig are made of equal dimensions, in order that the same spare spars and sails may answer to replace those of either mast. The rig of a brig is useful chiefly for merchant vessels, because of its dividing the whole area of sail into small parts, which can be handled by a small crew.

A *Brigantine* or *Hermaphrodite Brig*, as it is frequently called, has the bowsprit and foremast of a brig and the mainmast of a schooner, each with its proper station, proportions, rig, and sails. Vessels of this kind are used in the merchant ser-

vice, with a view to combining, to a certain extent, the advantages of the square rig with those of the fore-and-aft rig.

A *Ship* is a vessel with three square-rigged masts, each provided with the full series of square-sails, a bowsprit and jib-boom, with jibs and stay-sails, and a gaff-sail on the mizzenmast, called the *spanker* or *driver*. To show the names given to the masts, spars, and sails of a ship,

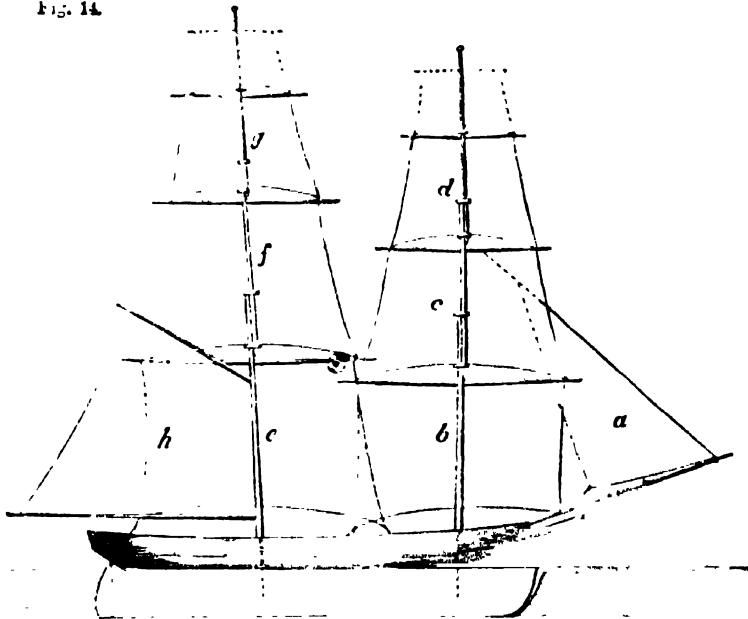
reference may be made to the Plate accompanying this article.

MASTS AND SPARS.

- | | |
|--|--|
| a, bowsprit. | b, fore-topgallant-yard. |
| b, jib-boom. | s, fore-royal-yard. |
| c, flying jib-boom. | t, main-yard. |
| d, dolphin-striker. | u, lower main-top-sail-yard (see i above). |
| e, foremast. | v, main-top-sail-yard, or upper main-top-sail yard. |
| f, fore-topmast. | w, main-topgallant-yard. |
| g1, fore-topgallantmast } one | x, main-royal-yard. |
| g2, fore-royal pole } spar. | y, cross-jack (or cro'-jack) yard |
| h, mainmast. | z, lower mizzen-top-sail-yard. |
| i, main-topmast. | aa, mizzen-top-sail-yard, or upper mizzen-top-sail-yard. |
| j1, main-topgallantmast } one | bb, mizzen-topgallant-yard. |
| j2, main-royal pole } spar. | cc, mizzen-royal-yard. |
| k, main-skysail pole or signal pole. (Some ships have a skysail pole or signal pole on each mast.) | dd, main-trysail-gaff. (Some ships have a try-sail-gaff on the foremast also.) |
| l, mizzenmast. | ee, spanker-boom, or driver-boom. |
| m, mizzen-topmast. | ff, spanker-gaff, or driver-gaff. |
| n1, mizzen-topgallant } one | |
| n2, mizzen-royal pole } spar. | |
| o, fore-yard. | |
| p, lower fore-top-sail-yard. | |
| q, fore-top-sail-yard, or upper fore-top-sail-yard. | |

There are also a few other spars for special occasions, which are not shown in the Plate.

Fig. 14.



Principal Sails of a Brig.

SAILS.

- | | |
|--|---|
| a, fore-staysail. | g, lower } main-top-sail. |
| b, fore-topmast-staysail. | r, upper } |
| c, inner jib. | (See h and i above.) |
| d, outer jib. (Most ships have only one jib, of an area about equivalent to the combined effective area of the two jibs in the present example.) | s, main-topgallant-sail. |
| e, fore-topgallant-staysail. | t, main-royal. |
| f, flying jib. | u, main-trysail, or main-spencer. (Sometimes there is a trysail or spencer on the foremast also. Sometimes the place of the main-trysail is occupied by the mizzen-staysail.) |
| g, fore-sail, or fore-course. | v, mizzen-topmast-staysail. |
| h, lower } fore-top-sail; being equivalent to an ordinary fore-top-sail divided into two parts of equal depth. | w, mizzen-topgallant-staysail. |
| i, upper } | x, mizzen-course, or cro'-jack (seldom used). |
| j, fore-topgallant-sail. | y, lower } mizzen-top-sail. |
| k, fore-royal. | z, upper } |
| l, main-staysail. | (See h and i above.) |
| m, main-topmast-staysail. | aa, mizzen-topgallant-sail. |
| n, main-topgallant-staysail. | bb, mizzen-royal. |
| o, main-royal-staysail. | cc, spanker or driver (instead of which the mizzen-trysail is hoisted in stormy weather). |
| p, main-sail, or main-course. | |

The following additional sails are not seen in the Plate: — *Sky-sails, sky-scrapers, or flying lites*, being small square-sails above the royals; *studding-sails*, on the foremast and mainmast; and the *ringtail*, set beyond the leech

of the sail. Although the sails are generally made of cotton, they may also be made of wool, and smooth water-laid sails are sometimes used.

The sails are prepared in two ways, divided into *standing rigging* and *running rigging*. The material for standing rigging consists of hemp ropes, iron ropes, or wire ropes, and for running rigging, the following are the kinds of hemp rope chiefly used in rigging:—

- Hawser-laid rope = 3 strands.
 Cable-laid rope = 3 hawser-laid ropes = . . . 9 strands.
 Shroud-laid rope = core or heart surrounded by 4 strands.

Cair ropes are made of coconut fibres, and are useful where great lightness is required, because they float in water. Wire rope consists generally of six strands laid or spliced round a hempen core, each strand consisting of six wires, and the contrary way round a smaller hempen core.

Rigging chain is usually of the unstudded or open-linked kind, with oval links. Wire and chain rigging is preserved by galvanizing or coating with zinc. Hempen rigging is preserved by means of tar.

Standing rigging consists mainly of ropes in two sorts of positions: in a fore-and-aft vertical plane, when they are called *stays*; and in an oblique position, extending downwards and backwards in pairs from the head of a mast, when they are called *shrouds* and *backstays*. The pressure of the wind on the sails produces thrust on the mast and tension on the standing rigging. When the sails are filled and braced directly athwartships, the tension is equally divided between the shrouds and backstays at either side of the mast; when the sails are braced obliquely, the tension is greatest on the rigging at the weather side; and when the sails are braced up very sharp, the whole tension falls upon the weather rigging.

The Plate shows the important parts of the standing rigging of a full-rigged ship. Vessels of less complex rigging differ chiefly in having fewer parts.

STANDING RIGGING.

1. Bowsprit-shrouds.
 2. Bob-stay.
 3. Fore stay, with fore-preventer-stay alongside of it: one to act if the other is carried away.
The term *preventer* is applied to any part of the rigging intended to act in the event of another part being lost or disabled.
 4. Fore-topmast-stay (with preventer-stay).
 5. Inner jib, 6 Outer jib, 8 Flying jib-stay.
 - 7 Fore-topgallant, 9 Fore-royal-stay.
 10. Mast-ropes and back-ropes.
 11. Fore, 23, Main, 35, Mizzen shrouds.
 12. " 24, " 36, " futtock-shrouds.
 13. " 25, " 37, " topmast-shrouds.
 14. " 26, " 38, " topgallant-shrouds.
 15. " 27, " 39, 42, " topmast-backstays.
 16. " 28, " 40, " topgallant-backstays.
 17. " 29, " 41, " royal-backstays.
 30. Main-skysail-pole backstays.
- Crossing the shrouds are seen the *ratlines*, forming the ladders by which men go aloft.
18. Main (with preventer), 31. Mizzen-stay.
 19. " 32. " topmast stay.
 20. " 33. " topgallant stay.
 21. " 34. " royal stay.
 22. Main-skysail-pole stay. 55. Foot-ropes.

The lower ends of the standing rigging are usually secured by means of a pair of *dead-eyes*, or *hearts*, or of *thimbles*, drawn together by means of three or four turns of a rope called a *lanyard*. A *dead-eye* is a round block of some very hard, tough, and durable wood (*lignum-vitæ* being almost always employed in the merchant navy and in the royal navy), or of cast iron, with three or four holes in it for the lanyard, and a *score* or groove round its circumference for the shroud or backstay. A *heart* differs from a *dead eye* chiefly in having one large hole, with scores at the ends for the turns of the lanyard. A *thimble* is an iron ring fitting into an eye at the end of a stay. In some cases a *purchase*, consisting of two blocks with revolving sheaves drawn together by a lanyard, is used for setting-up a stay.

Description of the Running Rigging of a Ship.—The Plate shows most of the more important parts, as follows:—

RUNNING RIGGING.

- 43, 45, 47. Starboard, fore, main, and mizzen tacks. (Port-tacks not seen.)
- 41, 46, 48. Slings of fore, main, and cross-jack yards (usually of iron chain).
49. Starboard-vangs of main try-sail and spanker gaffs. (The port-vangs are not seen.)
50. Spanker-boom-sheets, or quarter-guys.
51. Peak halliards of gaffs. (The throat-halliards are not seen.)
52. Peak and mizzen signal-halliards. (The main and fore signal halliards are not seen.)
53. Ree-points on fore and main courses, top-sails, and spanker.
54. Jib and stay sail sheet (each sail has a pair, port and starboard).
56. Lifts (a pair to each yard).
57. Braces (each yard has a pair, but the starboard braces only of the lower and top-sail yards are seen).
57. Starboard upper mizzen-top-sail preventer-brace.
58. Reef-tackles of fore and main courses and of top-sails.
59. Clew-garnets of courses.
60. Clew-lines of upper square-sails.
61. Brails of spanker.
62. Tripping-line of spanker.
63. Spanker outhaul.
64. Spanker-boom topping-lifts.

In running rigging each rope is led once, twice, or any required number of times, between the yard or sail to be moved, and the point towards which it is to be moved; then led through a fixed block secured at or near the latter point, and thence led down on deck, where it is *belayed* (or temporarily secured) to *bitts*, *cleats*, or *belaying-pins*. The halliards of some of the lighter and loftier sails of

ships are sometimes belayed in the tops instead of on deck. Belaying-bitts consist of a pair of upright posts and a cross-piece. They serve to belay the largest ropes, and are usually placed on deck, near the lower masts. Belaying-cleats are T-shaped, with a short neck and long arms, or *horns*. They are fixed, usually with two bolts, in any position where they may be required, as inside the bulwarks, on the flat of the weather-deck, or round the lower masts, near the deck. Sometimes they are seized to shrouds, and are then T-shaped, and called *shroud-cleats*. Belaying-pins (which are of wood, iron, or metal) are movable, and fit into holes in rails called *racks*, which are fixed in any convenient position—such as round the lower masts, inside the bulwarks, or seized to the shrouds.

SAIN FOIN (*Orobrychis sativa*) is a plant of the order LEGUMINOSA, suborder Papilionaceæ, which grows luxuriantly and spontaneously on the calcareous mountains of the middle and south of Europe and Asia. It has been a regular cultivation in England since 1651, for the purpose of supplying fodder for cattle either in the green state or when converted into hay. There are few plants which have more rapidly improved the value of poor than calcareous soils than sainfoin; and in the richer kinds of loam, which contain a considerable proportion of calcareous matter its value surpasses even that of broad clover, giving fully as great a return with a much smaller expenditure of manure. The plant has a strong woody and fibrous root, which dissimulates itself into the fissures of calcareous rocks, and finds moisture in the driest seasons, while its spreading fibres keep the earth from being washed down the steep slopes of the hills. Being nearly perennial, or at least of many years' duration, it binds the soil together. In favourable situations it may be made into hay twice in the year, or cut oftener as green fodder. In the moist and exposed situations it gives at least one good crop of hay. The plant grows about 2 feet high, and the stem, which branches out into many compound leaves, is crowned with a beautiful spike of flowers of the papilionaceous kind. After it has been mown it shoots out rapidly again, and may be advantageously depastured by every kind of cattle or sheep. The duration of sainfoin depends on the nature of the soil and the state it was in with respect to weeds when it was sown. A cold wet subsoil soon destroys the roots, whereas a free and dry one, whether rocky or gravelly, gives them vigour. It is usually sown in spring in a crop of barley or oats, which should be sown thin in order that the sainfoin may not be smothered. It does not produce a large crop the first year, for some of the seeds will be a tacker in the ground before they spring up. It is in perfection after the second year, when a portion may be reserved for seed. Sainfoin hay is extremely nourishing for every kind of cattle, especially if it has been made with at least rain.

When sainfoin begins to appear thin on the ground, and other plants seem to get the better of it, the soil should be broken up. The land will be found much improved in fertility by the sainfoin. A poor chalk or gravel, which before would scarcely repay the seed sown in it, will now, by the gradual decay of the roots and fibres, produce several good crops without any other manure. The prudent farmer, however, will not entirely destroy, by repeated crops of grain, that cohesion of the soil which is produced by the roots of the sainfoin; but by a judicious course of proper application of the manure which the sainfoin enables him to make, he will keep up the newly-acquired fertility until, in the course of ten or twelve years, he can sow new sainfoin with the prospect of a better crop than the first.

There is nothing peculiar in the manner in which sainfoin is made into hay. It should not be shaken about too much, for fear of injuring the flower and breaking off the leaves. The name *Sainfoin* or *Saintfoin* is perhaps from *Sang-foin*, referring to the red colour of its flowers. Some derive it from the French for "wholesome hay."

SAINT. For names of places beginning with Saint reference should be made to the second name; thus, St. Alban's will be found under ALBAN'S, ST.

SAINT (Lat. *sanctus*, holy), a person set apart for his holiness during life as worthy of reverence and honour after his death. Prayers to saints are held as efficacious in very many countries and faiths, and the intercession of the saints is freely invoked by sinners needing forgiveness.

In the Roman Catholic Calendar, as also the Greek Orthodox Calendar, every day is placed under the favour of some saint, and indeed there are a great many saints to each day. Persons regard their saints' day rather than their birth day as their festival in those communions. The chief saints' days in England now or formerly connected with popular customs are as follows: *January*—St. Agnes, 21; St. Vincent, 22; St. Paul, 25. *February*—St. Blasius, 3; St. Valentine, 14. *March*—St. David, 1; St. Patrick, 17. *April*—St. George, 23; St. Mark, 25. *May*—St. Urban, 25. *June*—St. Barnabas, 11; St. Vitus, 15; St. Peter, 29. *July*—St. Uric, 4; St. Swithun, 15; St. Margaret, 20; St. Bridget, 23; St. James, 25. *August*—St. Rock, 16; St. Bartholomew, 21. *September*—St. Michael, 29. *October*—St. Ethelburga, 11; St. Simon and St. Jude, 28. *November*—St. Martin, 11; St. Clement, 23; St. Catherine, 25; St. Andrew, 30. *December*—St. Nicholas, 6; St. Stephen, 26; St. John the Evangelist, 27.

It is said that saints have been specially selected out by nations as their patrons, or by invalids as specially efficacious in assailing to cure certain maladies, or by tradesmen and others as able to grant them favours as their patrons.

National Patron Saints are the following among others:—Austria, St. Columban and St. Leopold; Bavaria, St. Wolfgang; Belgium, St. Wendelans; Denmark, St. Canute; England, St. George; Flanders, St. Peter; France, St. Denis; Germany, St. Martin and St. Boniface; Holland, St. Mary; Hungary, St. Louis; Ireland, St. Patrick; Italy, St. Antony; Norway, St. Olaf; Poland, St. Stanislaus; Portugal, St. Sebastian; Russia, St. Nicholas; Scotland, St. Andrew; Spain, St. James (Jago), &c.

Diseases cured by Saints, according to the faith of our forefathers, were the following among others.—Inflammation, by St. Antony; toothache, St. Lucey; the stone, St. Benedic; throat diseases and accidents, St. Blaise (Blasius); sudden death, St. Christopher; sore eyes, St. Clara; the gut, St. Genew; palsy, St. John; fistula, St. Liberius; the itch, St. Martin; fevers, St. Petronilla and St. Genevieve; coughs, St. Quentin; madness, St. Rufin; the plague, St. Sebastian; lameness, St. Wolfgang, &c.

Trades protected by Saints were the following among others.—Carpenters, by St. Joseph; grocers, St. Antony; millers, St. Arnold; woolcombers, St. Blase; spinners, St. Catherine; goldsmiths, St. Dunstan; blacksmiths, St. Eloi; barbers, St. Francis; coopers, St. Hilary; master shoemakers, St. Martin (cobblers, St. Crispin); painters, St. Luke; parish clerks, St. Nicholas; fishermen, St. Peter; bakers, St. Wilfrid; hatmakers, St. Wilfrid; shepherds, St. Wendeline.

St. Barbara protected hails, St. Agatha valleys, St. Silvester fests, St. Oyth guarded the housewife's keys, St. Anne gave wealth and also helped to find what had been lost. St. Antony protected dogs, St. Terrell geese, St. Gallus goose-guys, St. Gortunde chickens and eggs, St. Hubert dogs, St. Eloy horses, St. Pelagius oxen, St. Wendeline sheep, &c.

But though these remarks may serve to clear up many allusions in old plays and books otherwise obscure, it must be remembered that the list is far from exhaustive, and that in very many of the cases given two, and sometimes three, saints were called upon by worshippers for the same good effect. Those given are merely the chief saints invoked.

The great authority on the lives of the saints is the vast collection of the Bollandist fathers, the *Acta Sanctorum*, which has been forming since 1629, and of which perhaps our generation may see the conclusion. It is perhaps unnecessary to say that it greatly favours the saints of the West, and is far less full and detailed on those of the East, especially saints of the Greek Orthodox Church as distinct from the Roman Catholic. See BOLLANDISTS.

SAINT ELMO'S FIRE. See ELMO'S FIRE, ST.

SAINT GEORGE'S ENSIGN, the distinctive flag of the British navy, consists of a red cross on a white field, with a union-jack in the dexter chief corner. As the old division of the navy into Red, White, and Blue squadrons was abolished in 1864, all ships now carry the St. George's ensign. The red ensign belongs to government vessels not ships of war, and the blue to the merchant navy.

SAINT HILAIRE, GEOFFROY. See GEOFFROY.

SAINT JOHN'S WORT. See HYPERICUM.

SAINT JUST, LOUIS ANTOINE LEON DE, a celebrated French revolutionist, was born at Décize in the Nivernais, 26th August, 1767. He came of a good French family, and after being educated at Soissons by the Oratorians, he went to study law at Rheims, but afterwards returned home and devoted himself to literature. He published in 1789 a dull and licentious poem entitled "Organt," and followed this by another work of a similar character, "Mes passe-temps, ou le Nouvel Organt," in 1792, but between these he issued in 1791 a work of a different character, entitled "Esprit de la Revolution et de la Constitution de la France." On the outbreak of the Revolution the inhabitants of his native commune elected him lieutenant-colonel of the National Guard, and sent him to Paris to assist at the Fête of the Federation. In September, 1792, he took his seat in the National Convention as member for Aisne, and he soon became known as a devoted adherent of Robespierre and an enthusiastic advocate of extreme measures. He was at this time but twenty-four years of age, and was, says Carlyle, "a youth of slight stature, with mild mellow voice, enthusiast olive complexion, and long black hair, more like a student than a senator." His almost feminine countenance and his unswerving adherence to Robespierre obtained for him the appellation of the "Saint John of the Messiah of the People," but though he was of irreproachable morals in private life, his public career was marked by the determination to lay aside all scruples in order to attain his ends. He voted for the execution of the king, advocated the concentration of all power in the Convention, including the supervision of military operations, accompanied Lebas in the capacity of a consul to the army of the Rhine, and established the guillotine in Alsace. As the minister of Robespierre, he was chiefly responsible for the drawing up of the stern and sanguinary measures designed to repress the royalists in France and repel the invading forces on the frontier, and as president of the Convention, to which post he was elected in February, 1794, he drew up the report which led to the arrest of Danton, Hébert, and their adherents. With Couthon and Robespierre he formed the triumvirate of the Reign of Terror, and, like his colleagues, he appeared to be utterly indifferent to deeds of cruelty and bloodshed, however appalling. He was ultimately involved in the downfall of Robespierre, and was executed along with him on the 24th July, 1794, displaying to the last a sullen firmness and self-possession. St. Just was unquestionably a sincere fanatic, and he was distinguished for his enthusiasm, determination, unhesitating audacity, and facility of speech rather than for great abilities. His "Œuvres Politiques" were published in 1833-34, and his life has been written by Fleury (two vols., 1852) and Hamel (1859).

SAINT THOMAS' HOSPITAL was founded as an almshouse in Southwark by Richard, prior of Bermondsey, in 1213, and was surrendered to Henry VIII. in 1538.

In 1551 the corporation of the city of London, having purchased the manor of Southwark from Edward VI., repaired and enlarged the hospital, and admitted to it 260 poor, sick, and helpless persons. It was demolished in 1863, the site having been required by the South-eastern Railway Company. The new building, erected at Stangate, near the Surrey side of Westminster Bridge, opposite the Houses of Parliament, and opened by her Majesty in 1871, is one of the finest and most suitable institutions of the kind in the world. It contains beds for 650 patients, and an operating theatre large enough to accommodate 600 students.

SAINT VITUS' DANCE. See CHOREA.

SAINTE-BEUVE, CHARLES AUGUSTIN, critic and miscellaneous writer, was born at Boulogne in 1801, and educated there and at Paris. He studied medicine and practised it for a time, but his tendencies towards literature were too strong. He became a contributor to the *Globe*, the organ of Young France as it was before the Revolution of the Three Days, and abandoned his profession. He published poems, novels, a well-written history of French poetry in the sixteenth century, contributed to the *Revue des Deux Mondes*, and in 1840 gave to the world the first volume of his history of "Port Royal," the most elaborate of his books. It is as a critic, however, that M. Sainte-Beuve is best known. In 1850 he began to contribute to the *Constitutionnel* a series of weekly criticisms on books, called from the day of their appearance "Causeries du Lundi," which have had many readers and admirers even in England. Delicacy of insight, catholicity of judgment, and general good sense distinguish these papers, which are flawless gems both of criticism and of literature. Some years after the *coup d'état* he was appointed professor of Latin poetry in the Collège de France; but the students, indignant at his acceptance of office under the Second Empire, disturbed his inaugural lecture, and his professorship became merely nominal. He died in October, 1869.

SAINTON-DOLBY, CHARLOTTE HELEN, *née* Dolby, the finest contralto singer of her day, was born in 1821 and died in 1885. She studied at the Royal Academy of Music, where she was a king's scholar, and after completing her studies became an honorary member of that institution. Her refined singing, exquisite purity of tone and tune, and perfect clearness of speech in song at once claimed the public favour on her appearance; and with great good taste she chose oratorio and ballad-music as her chief studies, both of them departments of music specially English in construction and development. Mendelssohn so highly esteemed Miss Dolby's singing that he wrote the contralto part of "Elijah" especially for her. In 1860 Miss Dolby married M. Prosper Sainton, principal violinist at many London orchestras, but of French birth. In 1872, having retired from the boards, she opened a singing school, which speedily took very high rank. Madame Sainton-Dolby wrote several very charming songs, and some cantatas of merit.

SAINT-PIERRE, JACQUES HENRI BERNARDIN DE, was born at Havre on the 19th of January, 1737. His father, Nicholas, pretended to be a descendant of Eustache de Saint-Pierre, the celebrated mayor of Calais, whose history, however, recent research shows to be somewhat mythical. Bernardin's character was chiefly moulded by his mother—a devout woman of tender and poetical temperament; and his favourite books in childhood were the "Lives of the Saints" and the collections of legends which are found in all Roman Catholic libraries. After a somewhat imperfect education at home he was placed as boarder and pupil with a parish priest at Caen. Bernardin went with an uncle, a sea-captain, to Martinique when about twelve years old, but returned and finished his studies at the College of Rouen, obtaining,

when he left the college in 1757, the first prize for mathematics. He now attended a military school for about a year to acquire a knowledge of engineering, which he intended to adopt as a profession. He received an appointment as engineer in the French army assembled at Düsseldorf, but quarrelled with the engineer-in-chief. He was promised a commission in a French expedition about to set out to assist the Maltese knights against the Turks; but he was foolish enough to go without the commission to Malta, where he was treated as an impostor, and had to suffer many indignities. He returned with difficulty to Paris, and discovering that by giving lessons in mathematics he could not procure the very barest subsistence, resolved to try his fortune abroad. Eventually, in a penniless condition, he reached St. Petersburg, and it seemed as if he were doomed to die of starvation. But one happy and unexpected incident after another brought him finally to Moscow, where he was introduced to the Empress Catharine, who gave him a most gracious reception, which he owed perhaps in great measure to his remarkable personal beauty. As an officer in the Russian army he served in Finland. After a time he wearied of Russia, and he took his passage in a vessel bound for the Isle of France, where he had accepted a situation as engineer in 1768. Rich with the most varied experiences, in June, 1771, he returned once more to Paris, where he became acquainted with Rousseau, and formed new views of society; those which colour with a somewhat excessive sentimentality his charming novellettes. In 1773 he published his "Voyage to the Isle of France," which has an unflagging interest from its fresh and delicious pictures. Then came, after an interval of rather more than ten years, the "Studies of Nature," and then in 1788 the book which has its chosen place in the universal literature of the world, "Paul and Virginia." A work of kindred beauty, and of not much later date, was "The Indian Cottage." Bernardin de Saint-Pierre died of apoplexy at his country house, Brigny, on the banks of the Oise, on the 21st of January, 1814. He was twice married.

SAINT-SIMON, LOUIS DE ROUVROI, DUC DE, the author of those memoirs which reveal more exactly than any other book the unvarnished features of the French court during the old age of Louis XIV. and the regency of the Duke of Orleans, was born at La Ferté Vidame, the family seat, on the 16th of January, 1675. After careful education at home he was admitted by the king, who was his godfather, into the regiment of musketeers, and making his first campaign in 1692 under the Duke of Luxembourg, was at the siege of Namur and the battles of Fleurus and Nerwinde. After the peace of Ryswick he resigned his commission in the army, because he had not received the promotion to which he thought himself entitled. Wealth, rank, and fine manners made him popular with other courtiers, and he found intense gratification himself in noting down in his journal details of his daily experience, which he gathered up with singular sagacity and power of observation. The king, displeased at his quitting the army, looked coldly on him, and disapproved also of the duke's tenacity in upholding the most trifling privileges of his order. The portrait of the Grand Monarque in the "Mémoires," therefore, though no doubt faithful, is not set off by any roseate hues of flattery. With the Duke of Orleans Saint-Simon was on much better and more intimate terms, and upon the establishment of the regency Saint-Simon was made a member of the council of state, and enjoyed a large measure of the regent's confidence. In 1721 he was sent to Madrid to negotiate the marriage of the young king (Louis XV.) to the Infanta, and of the regent's granddaughter to the Prince of the Asturias. On the way he was attacked by the small-pox, but recovered, and was made a grandee of Spain. After the death of the regent he quitted the court and retired to

SAL'ADIN, the name given by Europe in writers to Mulek al-Nasir Salih ed Din abu Mogafer Yusuf, the famous sultan of Egypt and Syria, was born in 1136 (A.H. 532) in the castle of Tecrit on the Taurus, of which his father Ayub, a Kurd of the tribe of Rakad, was governor for the Seljukian sovereign of Persia. Ayub and his brother Shirkoh subsequently transferred themselves to the service of Zenghi, atabek of Syria, by whose son, the renowned and famous Sultan Noor-ed Deen, they were raised to high military honours; and upon Shirkoh (d. 1163) being appointed general of the troops designed to reinstate the Vizir Shawer in Egypt, a subordinate command was intrusted to his nephew. When the subjugation of Egypt was completed, in 1168, Shirkoh became, with the nominal rank of vizir to the Fatimid caliph, viceroy of the kingdom for Noor-ed-Deen; but dying the same year, bequeathed his authority to his nephew. The extinction of the Fatimids in 1171 left Saladin virtually sovereign of Egypt; and he assumed the title of sultan, extending his dominions over Yemen to Mount Taurus in Cilicia, and from Tripoli in Africa to the Tigris, the continuity of his rule being interrupted only by the Latin kingdom of Jerusalem, with which the violation by Reginald de Chatillon of a four years' truce soon afforded him a pretext for hostilities. In the famous battle of Hittin or Tiberias (July, 1187) the Christians, betrayed by the Count of

Tripoli, were utterly overthrown; the king, Guy de Lusignan, was taken prisoner, and received by the victor with royal generosity; while his partner in captivity, Reginald de Chatillon, was decapitated as a punishment for his perfidy. All the towns of the Frank kingdom now rapidly fell before the arms of the sultan; and his triumph was crowned by the capture of Jerusalem, which surrendered after a siege of fourteen days (2nd October, 1187), after having been eighty-eight years subject to the Franks. The next two years were principally employed in reducing the fragments of the Latin dominion; but Tyre was successfully defended by Conrad of Montferriat, and the occurrence of the third Crusade (1189) enabled the Christians again to take the field.

In the spring of 1192 hostilities were resumed; and the Christians, led by Richard, king of England, penetrated to within a short distance of Jerusalem, where Saladin awaited their attack; but the dissensions of the Crusaders occasioned a retreat, and both sides were not unwilling to listen to terms of accommodation. The three years' truce, which was concluded in September, 1192, left Jerusalem to the sultan, while the Christians were confirmed in possession of the coast from Jaffa to Tyre. Saladin died a few months after the termination of the war, 4th March, 1193. "At the hour of his death," says Gibbon, "his empire was spread from the African Tripoli to the Tigris, and from the Indian Ocean to the mountains of Armenia." He was unquestionably the greatest Kurd that has ever appeared in the pages of history, and Christian writers vie with Mohammedan historians in praising his chivalrous honour and courtesy, his undaunted courage, and his great achievements as an administrator and warrior.

Saladin Tithe was the name of a tax levied by Richard I. in 1188 to get money for his crusade. It is remarkable in our history as the first tax on income ever levied. Four lawful men of each parish were sworn to declare the proper amount payable by each parishioner. The second tax of the kind was the ransom tax for Richard in 1193, when as much as a fourth of the year's income was demanded. After this our kings availed themselves freely of this new financial idea, and levied subsidies of various proportions. In 1335 and after subsidies were usually a fifteenth of the

income. The exact amount was not fixed in the Saladin tithe, but it seems to have been about a tenth, on the average.

SALAMAN'CA, the Roman *Salmantica*, a city of Spain, and the capital of the province of Salamanca, is built on three hills in the form of an amphitheatre on the banks of the Tormes, which washes part of its walls. Its numerous stately buildings and fine old churches give this city so venerable an aspect that the Spaniards call it *Roma la Chica*, or Little Rome. The new cathedral, begun in 1513, but not finished till 1734, is a magnificent building, in a style partly Gothic and partly Italian. Close to this is the old cathedral, a very remarkable Gothic building of the twelfth century, containing many interesting monuments. Beside the above there are in Salamanca numerous churches and a great number of monasteries. During the middle ages this city acquired great celebrity from its university, founded in 1209 by Alfonso IX. of Leon, and which was once known as the "Mother of Virtue, Science, and Art." There were formerly twenty-five colleges attached to it, besides four superior colleges, designed for the children of the nobility, two of which are remarkable for their size and architecture.

The city is badly built, with narrow, crooked, and dirty streets. It has, however, some fine squares, with ornamental fountains. The principal square, or Plaza Mayor, which is in a central spot, is the largest in Spain. It is a quadrangle surrounded by an arcade, embellished with marble medallions, representing several Spanish kings, and all the kings of Castile and Leon down to Charles III., in whose reign it was built. It is sometimes used as a bull ring, and is capable of accommodating from 16,000 to 20,000 spectators. Salamanca suffered greatly during the Peninsular War, having sustained several sieges, during which some of the finest monastic buildings were either completely destroyed or riddled with cannon shot. The British, commanded by Wellington, defeated the French under Marmont near Salamanca, 22nd July, 1812. A great part of the city within the walls is now in ruins. The population is about 18,000.

SALAMAN'DER (*Salamandrina*) is a section of the order URODELA, class AMPHIBIA. The salamanders are



Blue-spotted Salamander (*Pleurodon glutinosus*).

tailed lizard-shaped amphibians, breathing by means of lungs, and without gills or gill-openings when adult. They have four limbs, the anterior pair having four toes, the posterior five. The *Salamandrina* are extremely tenacious of life, and have, moreover, the power of reproducing excised or injured parts.

In the genus *Salamandra* the head is thick, the eyes large, the gape of the mouth ample, the tongue broad, the palatine teeth arranged in two long series, the parotids large, the body sprinkled with many small glands, the toes

free, and the tail rather smooth. The Spotted Salamander (*Salamandra maculosa*) is 6 or 8 inches long. The body is black, with yellow spots and numerous prominent warty excrescences on the sides. It inhabits Central Europe and the mountainous parts of the south of Europe and North Africa. The salamander is, unlike the truly allied NEWT (*Triton*), ovoviviparous, though the young at first inhabit the water, and undergo metamorphoses till they arrive at the mature state which fits them for living upon land, where they haunt cool and moist places, being not

unfrequently found about fallen timber or old walls. The food principally consists of insects, worms, and small molluscs. In the winter it retires to some hollow tree or hole in an old wall, or even in the ground, where it coils itself up, and remains in a torpid state till the spring again calls it forth. As it increases in size it constantly sheds its skin, which is moulted in flakes.

The body of the salamander is largely covered with warty glands. These secrete a milky fluid of a glutinous and acid nature, like that of the toad, which, if not capable of affecting the larger and more highly organized animals, appears to be a destructive agent to some of those which are less highly organized. Thus Laurenti provoked two gray birds to bite a salamander, which at first attempted to escape from them, but being still persecuted, ejected some of this fluid into their mouths; one of the lizards died instantly, and the other fell into convulsions for two minutes and then expired. Some of this juice was introduced into the mouth of another lizard, it became convulsed, was paralyzed on the whole of one side, and soon died. According to Dr. Barton, this fluid, which the animal secretes in large quantities when irritated, and is then capable of ejecting to some distance, is not soluble in water, though it dissolves readily in spirits of wine. He found the taste of the juice of *Salamandra atra* extremely acid, resembling corrosive sublimate, and very astringent.

Anciently, and indeed until comparatively recent times, the salamander was regarded with horror as one of the most venomous of creatures; not only its bite produced death, but even the application of its saliva and whatever fruit it crept over became so impregnated with poison. It was consequently incapable of being consumed by fire, but even it possessed the power of extinguishing flames.

The Black Salamander (*Desmognathus atra*) is found in the Alps and the mountains of Southern Germany. It is small, slender, and the body and tail are black and ringed. The Red Spotted Salamander (*Pseudotriton ruber*), a North American species, is from 4 to 6 inches long, red above, with many black spots, orange-red on the sides and abdomen. It is common under rocks and fallen and decaying trees, and lives on insects. The Blue-spotted Salamander (*Plethodon glutinosus*) is found from Massachusetts to Florida. It has a cylindrical body, with a very long tail and a large flat head. It is about 7 inches long, bluish-black above, with white spots. It is found under fallen trees. Several other species are found in North America and a few are Asiatic. The Axoroll (*Amphispoma axoroll*) is interesting from retaining under normal conditions a permanently larval form with external gills.

SALAMIS, now *Kabul*, and sometimes called Pityoussa or Island of Pines, is a small island adjacent to the coast of Attica. It forms the southern boundary of the Bay of Eleusis and is only separated from the mainland, at the eastern and western extremities respectively, by a narrow winding channel with deep water.

The form of the island is very irregular. On the west side it is indented by the deep Bay of Kabul, on which the town of Kabul stands, and on the east a long narrow peninsula projects towards the coast of Attica. Its greatest length from north to south is about 10 miles, and the area is about 50 square miles. The soil, though scanty, is productive.

It suited to the soil. It produces good honey, and with proper care excellent wine might be made. The population is about 4000.

Salamis was one of the Attic demoi from the time of Solon. In B.C. 480 was fought, in the eastern strait of Salamis, the great naval battle in which the fleet of Xerxes, numbering above 1000 ships, was defeated by the combined fleet of the Greeks, under Themistocles, and consisting of about 360 vessels. The battle secured the independence of Greece. Byron has commemorated the

circumstances of this famous victory, which was won by the Greeks in the presence of Xerxes himself:—

"A king sat on the rocky brow
Which looks o'er sea-born Salamis;
And ships by thousands lay below,
And men in nations—all were his!
He counted them at break of day—
And when the sun set, where were they?"

SALARY (Lat. *sal*, salt, which article formed part of the pay of the Roman soldiers), the recompense stipulated to be paid to a person periodically for services, usually a fixed sum payable yearly, half-yearly, or quarterly and monthly. The income of a clergyman is more usually called a stipend. When wages are stated or stipulated by week or day the compensation is not called salary, but pay in the case of military men, and wages in that of labourers.

SALE is a contract by which one man agrees to give to another money, and the other agrees to give something for the money, either a thing immovable, as land, or a movable thing, as merchandise. Where articles are given in exchange the contract is one of barter, not of sale. He who agrees to give the money is called the buyer, and he who agrees to take the money is called the seller. A sale may be made by the owner of the thing, or by a person who has his authority to make the contract. Sales of movables made in market overt, or open market, are valid though they are made by a person who has no title to the thing that is sold. When the price is agreed on between the buyer and the seller, and the thing to be sold is clearly ascertained, or so described as to be capable of being clearly ascertained, the contract of sale is complete. The delivery of the thing that is sold and the payment of the money are no part of the contract of sale; they are distinct transactions by which the thing that was agreed to be done is accomplished. Certain persons are in some cases restrained and in others disabled from buying and selling, but these restrictions and disabilities form no part of the law of sale; they belong to other branches of the law, such as infancy, insolvency, coverture, lunacy, and alienage.

Generally, all things may be the subject of sale, but there are some exceptions. Such are a mere title to lands of which a party is not in possession, a present duty to a living actually vacant, the pay of a naval or military officer, and some other things.

Property is distributed under the two heads of real and personal property, which differ materially in many respects, and the modes of effecting the sale of each of these kinds of property likewise materially differ. Some incidents, however, are common to a sale both of real and personal property. No sale is valid—

- 1st, Unless the parties to it act with good faith.
- 2nd, Unless there is agreement or consent.
- 3rd, No sale is valid the subject of which is illegal, or which involves an illegal transaction, or has for its object an illegal act.

In the case of a sale of lands it is assumed that the seller has a good title to them, and that he will deliver the title-deeds to the buyer, unless the written contract of sale which is required by statute shall vary these general terms. Otherwise, in failure of these particulars, the sale cannot be enforced. The right to receive a good title is one which is conferred upon the buyer by the law, independent of any agreement between the parties.

By the Statute of Frauds (29 Charles II., c. 3) certain forms were required in order to give effect to a sale of "lands, tenements, or hereditaments, or any interest in or concerning them." But if an agreement for sale has been made without the requisite formalities, and has been carried into effect in some material part, a court will in equity enforce the performance of the whole contract. In all other cases of contracts as to interests in land, "the agreement, or some memorandum or note thereof, shall be in

writing, and signed by the party to be charged therewith, or by some other person thereunto by him lawfully authorized." No established form is requisite, and it is not necessary that the agreement should be contained in one instrument: it may be collected from a series of letters, or a written offer followed by a written acceptance, or from documents referred to by a letter. An agent may be appointed verbally, and the same person may act as agent for both parties to the sale. An auctioneer is such agent, and his writing down the name of the highest bidder in his book is sufficient evidence under the Statute of Frauds.

When the contract for the sale of land is completed the buyer is in equity viewed as the owner of the estate. Important changes in the rights and liabilities of sellers and purchasers of real property have been made by the Vendor and Purchaser Act (1874), the Conveyancing Act (1881), and other statutes.

With respect to sales of personal property in England the common law required no formalities; and this is still so with respect to sales of movables made at one time, and together not exceeding in price £10. The 29 Charles II., c. 3, above referred to, which prescribes certain formalities in sales of land, also enacted (s. 17) that "no contract for the sale of any goods, wares, and merchandise for the price of £10 sterling and upwards shall be allowed to be good except the buyer shall accept part of the goods so sold and actually receive the same, or give something in earnest to bind the bargain, or in part payment, or that some note or memorandum in writing of the said bargain be made and signed by the parties to be charged by such contract or their agents thereunto lawfully authorized." By Lord Tenterden's Act (9 Geo. IV., c. 14, s. 7) the enactments of this statute are extended to all contracts for the sale of goods of the value of £10 sterling and upwards, notwithstanding the goods may be intended to be delivered at some future time, or may not at the time of the contract be actually made or fit for delivery.

There were formerly very material differences between English and Scotch law in regard to sale. These have to some extent been modified by legislation, particularly by the Mercantile Law Amendment Act (1856), 19 & 20 Vic. c. 60, and the corresponding English Act. Writing is not, and never was, required in sales of movables in Scotland, except in the case of shares in ships and joint-stock companies. Formal writing is, however, necessary in sales of heritable (or real) estate. Formerly the rules for conveying heritable property in Scotland were very technical and strictly construed, but important modifications were made by the Titles to Land Consolidation (Scotland) Act, 1868, and the Conveyancing (Scotland) Act, 1874, and heritage may now be conveyed by testamentary writings, without any formal words, provided the meaning be clear and the document be attested in terms of law. Stolen property may be recovered by the owner, though sold in open market. The same disabilities exist in Scotland as in England in regard to certain classes of persons entering into contracts of sale. Shares in joint-stock companies and in ships can, in both countries, be transferred only by writing.

SALE, GEORGE, an eminent Oriental scholar, was born in Kent, between 1680 and 1700, and was educated at King's College, Canterbury. He was trained for the law, and is believed to have practised it, but scarcely anything is known of his private life. He assisted in getting up the "Universal History," and he wrote the articles on Oriental history for Dr. Birch's "General Dictionary;" but his great work was his translation of the Koran, with elaborate notes and a valuable preliminary discourse, which was published in 1734. This translation formed a new epoch in the study of Islam and its literature, and though others more closely accurate have since been prepared, it still enjoys the widest sale among the English versions of the sacred book of the Mohammedans. He died prema-

turely on 14th November, 1736. His Oriental MSS., containing many choice articles in Arabic, Persian, and Turkish literature, were purchased for the Radcliffe Library, Oxford.

SA'LEM, a town of the United States, in Massachusetts, situated on the Bay of Massachusetts, 15 miles N.N.E. of Boston. It is the mother city of this state, and occupies a low site on a long peninsula between two inlets. It is irregularly built, but has many handsome houses and public buildings, atheneum, museum, &c. Its former East India trade has passed for the most part to Boston, and its wharves are now occupied by only a few coasting vessels. The city is supported by its leather, cotton, and jute steam-mills and factories. The population in 1880 was 28,184.

SAL'EP consists of the dried tubers of different species of Orchide, which have been known in medicine from very early times by the name *Orchis*. It is much valued in the East as a nutritious article of diet for its supposed general stimulant properties.

The Greeks were probably well acquainted with salep; Theophrastus and Dioscorides give descriptions of it. These accounts are copied in the writings of the Arabs, who call it "khusyut-al-salib," *i.e.* *testiculus vulpis*. The natives of India know it by the name "salp mistee," *i.e.* salp from Misr or Egypt. It would thus appear that they learnt its use from the Arabs. Sprengel considered that *Orchis papilionacea* was the orchis of the Greeks, as it is called salepi by the modern Greeks. In this country salp has been made from *Orchis mascula*, *lilifolia*, and *Morio*.

All these plants have two tubers charged with nutritious matter, and while one is nourishing the flower-stems and seeds of the current year, by which it is robbed of its store, the other serves as a reservoir for the flower-stem of the succeeding year. This last alone is fit for use. Both are dug up together, but the solid one only is retained. It is dipped in warm water, after which the fine brown skin is easily removed by means of a coarse cloth or brush. The tubers, when thus cleaned and peeled, are arranged on a tin plate and placed within an oven heated to the same degree as is necessary for baking bread; here they remain for seven or ten minutes, in which time they evolve their opaque and milky whiteness for a semi-transparent horn-like appearance and a yellowish colour, retaining their original bulk. Being withdrawn from the oven they are exposed during some days to dry and harden in the air; or by the employment of a very gentle heat they may be brought to the same state in the course of a few hours. All that is then required to adapt the salep for food is to boil it in water or milk to the required consistency. Before coffee became so common in Britain large quantities of salep were imported from Turkey, Persia, and India. It is still used as a diet drink in some parts of France. It contains a small proportion of starch and 18 per cent. of a peculiar mucilage called bassome, more nearly allied to cellulose than to gum; it will convert 40 parts of water into a thick jelly.

SALER NO, a town of Italy, the Roman *Salermon*, capital of the province of the same name, and in archbishop's see, is a walled town containing about 30,000 inhabitants, finely situated 30 miles E.S.E. of Naples, with which it is connected by railway on the sea-coast, and surrounded by a beautiful tract of country at the foot of the mountains. The streets are paved with lava, and are narrow, irregular, and dirty. The harbour, sheltered by a mole and defended by an old castle, is suited for small vessels. Salerno has a royal lyceum, a provincial court of justice, a theatre, and many churches. The most remarkable building is the cathedral, built in the eleventh century by Robert Guiscard, who adorned it with columns and a mosaic pavement from Paestum. It contains many historical tombs. Among the modern buildings are several Gothic edifices, and the palace of the intendant is very handsome.

The quay along the sea-shore is a fine promenade. There are manufactures of silk and cotton, copper and iron wares, and a productive fishery. Rice-grounds in the vicinity make the site unhealthy. The university of this city, one of the most ancient in Europe, and long the most celebrated for its school of medicine, still exists, but its reputation is gone. After the fall of the Roman Empire Salerno became the capital of a flourishing republic, the sovereignty of which was contested by the Greeks, Saracens, Lombards, and Normans, the latter of whom obtained possession of the city in 1076.

SALES, SAINT FRANCIS DE, was born of noble parents, near Annecy in Savoy, on 21st August, 1567. He acquired the rudiments of learning at the college of La Roche and Annecy. In 1578 he was sent to Paris, and placed under the care of the Jesuits till 1584, when he proceeded to Padua to study civil law under Guy Panciroli. On his return to his native country he gave up great worldly adventures in order to devote himself to the ministry of the church. The greatest success attended his first efforts in pulpit oratory, nor was he less notable in the fulfilment of his pastoral duties. He united the most untiring activity in visiting his flock, and in relieving the wants of the sick and poor, with an unobtruded solicitude and evangelized patience. In 1594, in conjunction with his relative, Louis, the canon of Geneva, he undertook a mission to the ancient duchy of Chablais for the purpose of converting the inhabitants from Calvinism, in which they were highly successful.

On his return to France to Annecy in 1596 he was appointed coadjutor to Claude de Guiller, the bishop of Geneva, with the title of Bishop of Neapolis *in partibus infidelium*. In 1602 he visited the court of France, where a course of Lent sermons, which he preached in the chapel of the Louvre, so well have recalled several of the most influential of the Calvinistic nobility to a belief in their ancient faith. On his return to his native country the same year he was appointed to the see of Geneva. He prepared himself by a close retirement of twenty days at the Castle of Sales for his consecration to this important office. In his new diocese he showed great zeal in reforming abuses among the clergy, in monasteries, and elsewhere. In 1610 he founded a religious order for females, called the Order of the Visitation. On the marriage of the sister of Louis XIII. of France with the Prince of Piedmont, D. Sales travelled abroad. He preached for the last time on Christmas Eve, 1622, the next day he was seized with a paralytic attack, under which he died on 28th December. His body's recovery was canonized by the Pope, Alexander VII.

The best edition of his writings, which are not very numerous, is that of Paris (1611, two vols. folio). The "Introduction to a Devout Life" remains a popular manual with the devout and ascetic, and has been translated into almost every European language.

SALFORD, a parliamentary borough of Lancashire, in the parish of Manchester, with which it is connected, so as virtually to form a portion of that city. The population of the borough in 1881 was 17,234. Three members are returned to the House of Commons, one having been added by the Redistribution of Seats Act of 1885. By a charter dated 1841, and extended in 1853, it is divided into eight wards, and governed by a mayor, sixteen aldermen, and forty-eight councillors. County courts, quarter sessions, and courts of record for the hundred of Salford are held here.

Salford was first founded and chartered by Ralph de Blundeville in 1229: the queen is now lady of the manor, as it belongs to the duchy of Lancaster. The town lies on the west side of Manchester, across the Irwell, over which are several bridges. It is 189½ miles from London by the North-western Railway, besides which there is canal, river,

or railway communication with all the other large cities in the kingdom. The supply of water for drinking purposes is abundant. Various articles are made here, but the inhabitants are principally employed in the Manchester trade and manufactures, cotton factories, print works, foundries, &c.

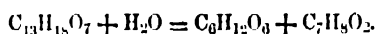
Within the last twenty years great improvements have been made in the street architecture of the town. The chief buildings are the Roman Catholic cathedral of St. John's, which is a noble cruciform structure, 200 feet long, with a spire 130 feet high, and many other churches and chapels, numbering about forty altogether. The town-hall was built in 1826, but has been considerably enlarged. A town-hall was also erected at Pendleton, an adjoining suburb, by the Salford corporation in 1868. The house of correction for Salford was erected in 1790, on a site of 5½ acres, from plans designed in accordance with the recommendation of John Howard, the philanthropist. The Salford and Pendleton Royal Hospital and Dispensary—a very useful institution—was established in 1827, and there are several endowed charities for the poor. A working man's college, built and opened in 1858, has been pre-eminently successful. Salford also contains the Manchester custom-house and bonded warehouses, public baths, military barracks (being the headquarters of the northern district), market-house, cattle market, mechanics' institute, &c. In 1846 three large and beautiful parks were opened by public subscription for the free use of the population of Manchester and Salford, and one of them, the Peel Park, is situated in the latter borough. It covers a space of 32 acres, and is embellished with statues of Queen Victoria, the late Prince Consort, Sir R. Peel, and Mr. Brotherton, the first M.P. for the borough. This park also contains a free lending library of about 13,000 volumes, a reading-room, and an extensive and well-arranged museum, which is annually visited by more than half a million persons. A spacious cemetery was opened in 1837.

SALIC LAW, or *Lex Salica*, is the name of the earliest and purest of the ancient Teutonic codes. It is concerned with the daily life and government of a confederation of German tribes, the Salian Franks, who lived along the lower Rhine lands. The popular idea that the Salic Law deals with the inheritance of the royal crown of France (the country which the Franks afterwards came to possess, and to which they gave their name in lieu of the more ancient Gaul) is extremely absurd, seeing that the distinctive character of these early Teutonic tribes, among whom are our own English ancestors, is that they had no king whatever; all the free warriors were equal and independent, and their elders and war-leaders were elected in the general assembly. The Salic law deals with thefts, assaults, the punishment of wrong-doing, the laws relating to bees, swine, cattle, &c. The famous passage, which has caused the misapprehension referred to, says "no portion of the inheritance to land passes to a woman." But it happened that, from the tenth century to the fourteenth, there was an unbroken custom in the Capetian family in favour of transmitting the crown in the male line only. For more than 300 years there was always a son or a brother of the reigning king to succeed, and, consequently, the opportunity for balancing the rival claims of remote collaterals never arose. Hence the growth of the overwhelmingly strong national feeling that such a mode of inheritance must be as illegal as it was unusual, and its reference to the half-mythical never-read *Lex Salica*. The Salic law has now abundant commentaries and critical editions, for it is the most important of early codes, as has been said. The best English edition is the parallel-text edition of Mr. Hessels, with all ten texts collated (1880).

The principle of non-inheritance of the crown by females was introduced into Spain by the Bourbons in 1700, but was formally abolished by decree in 1830, in order to provide

for the succession of Isabella (afterwards Isabella II.) on the death of her father, Ferdinand VII., which took place three years afterwards. The law of the now extinct kingdom of Hanover likewise forbade the succession of a female to the throne; and this led to the separation of Hanover from the crown of England on the death of William IV. and the accession of Queen Victoria, in 1837.

SALICIN, a neutral substance found in several species of willow bark. It is also present in the bark of the poplar and in the flower of the meadow sweet, or *Spiraea ulmaria*, natural order Rosaceæ, and other species. It is obtained in tabular colourless crystals, soluble in water and alcohol, but insoluble in ether. The formula is $C_{13}H_{18}O_7$. It melts at 120° C. (248° Fahr.), and decomposes at a higher temperature. Salicin has a bitter taste, and is much employed in medicine—in small doses as a mild tonic, and in large doses for acute rheumatism and in ague. Sulphuric acid imparts a deep red colour to salicin, which is characteristic, and may be employed as a test for detecting its presence. It is a glucoside, and when heated with dilute hydrochloric acid it is converted into glucose and saligenin ($C_7H_8O_2$).



Emulsin, and ptyaline from the saliva, have the same effect. Saligenin crystallizes in colourless pearly tables, soluble in water; ferric salts impart an indigo-blue colour to this solution. If the action of the hydrochloric acid is carried further the saligenin is again decomposed into glucose and salicin ($C_7H_8O_2$), which is insoluble in water, but soluble in alcohol and ether.

Salicin forms three derivatives with chlorine—chlorosalicin ($C_{13}H_{17}ClO_7$), dichlorosalicin ($C_{13}H_{15}Cl_2O_7$), and perchlorosalicin ($C_{13}H_{13}Cl_3O_7$), all compounds crystallizing in silky needles.

SALICINÆE is an order of Apetalæ. They are generally found inhabiting woods in the northern districts of Europe, Asia, and America. The most northern woody plant that is known, the *Salix arctica*, belongs to this order, in which there are only two genera, *Salix* and *Populus* (WILLOW, POPLAR), but these are of great importance on account of their timber and various economical uses.

All the species of the genus *Populus* consist of deciduous trees, mostly of a large size, growing in Europe, North America, Asia, and the north of Africa. The poplar has long been valued as an ornamental tree, and its various species have been extensively cultivated in Europe.

Salix is, in many respects, one of the most important genera of plants; the rapidity of their growth, the toughness and lightness of their wood, and their uses in medicine and the arts have caused them to be extensively cultivated. The species are chiefly natives of the colder parts of the temperate regions of the northern hemisphere.

In this order the flowers have stamens or pistils only, growing on distinct plants, and arranged in catkins; the perianth or disc is represented by scales in the form of glands, or by a cup-shaped body; the stamens vary in number from two to thirty, and are separate or united at their base; the ovary is superior, with one or two cells, containing numerous erect ovules on two to four placentas; the fruit is two to four valved, one-celled, with numerous hairy seeds; there is no perisperm, and the radicle is inferior. All the species are trees or shrubs.

SALICIONAL (or *Salcional* or *Salicet*), an organ-stop which, though a flute-stop, is so contrived as to have a reedy quality. It is of very small scale, and the mouth is cut up high. It may be considered a variety of the *Dulciana*. Its name is from *saliz*, the willow-tree, as its quality of tone is considered like that of a shepherd's willow-pipe.

SALICYLIC ACID. This acid exists ready formed in the flowers of *Spiraea ulmaria*, and as methylsalicylic acid in oil of winter-green (*Gaultheria procumbens*, natural order Ericaceæ). It is now usually made artificially from carbolic acid by heating it with caustic soda in the presence of a stream of carbonic acid. That prepared from the oil of winter-green, or natural salicylic acid, is the purest. It crystallizes in large four-sided prisms, having the formula $C_7H_6O_3$. It melts at 158° C. (316° Fahr.), and boils at 200° C. (392° Fahr.) in fine needles. It is slightly soluble in cold water, but very soluble in hot water and in alcohol. Ferric salts colour the solution deep violet. It is largely used in medicine as an antiseptic, and for surgical dressings, especially in cancerous affections. Salicylic acid and salicylic wool are silk and cotton wool impregnated with the acid, and employed in dressing wounds, being more efficient and less offensive than the same fabrics treated with carbolic acid. Mixed with collodion, salicylic acid is a popular corn solvent. Internally its effects resemble those of gumme. It is dibasic, and forms two series of salts called acid and neutral salicylates, having the respective general formulae $C_7H_4MO_4$ and $C_7H_5MO_3$, and mostly soluble and crystalline. Sodium salicylate and ferric salicylate are used in medicine, particularly for dressing wounds and destroying bacteria.

Chlorine, bromine, and iodine form conjugated acid compounds with salicylic acid.

Methylsalicylic acid is the most important ether of salicylic acid, forming as it does about 90 per cent. of the oil of winter-green. The formula is $C_8H_8O_3$, and it is also called Gaultheric acid. It is present also in the bark of the sweet birch (*Betula lenta*, natural order Buraceæ). It is a colourless oil of agreeable odour, having a specific gravity of 1.18, and boiling at 222° C. (431° Fahr.) Ferric salts colour the aqueous solution violet. It forms a number of conjugate acids with chlorine and bromine.

Ethylsalicylic acid ($C_9H_{10}O_3$) is a heavy colourless oil of specific gravity 1.097, and boiling at 225° C. (437° Fahr.)

SALICYL or **SALICYLOUS ACID** is the volatile oil of the *Spiraea ulmaria*, or meadow sweet, from which it can be obtained by distillation with water. It can also be obtained by fermentation from salicin, from dry distillation of quinic acid, and by oxidation from saligenin and salicin. It is a colourless, aromatic, inflammable oil, turning red on exposure to the air. The specific gravity is 1.173. Boiling point, 196° C. (384° Fahr.) It is soluble in water, alcohol, and ether. The solution is coloured deep violet by ferric salts. The formula is $C_7H_8O_2$. When heated with potash it is converted into potassium salicylate ($C_7H_5HO_2$) with evolution of hydrogen. It forms salts called salicylates, mostly yellow and crystalline, and having the general formula $C_7H_4MO_3$. Those of the alkalis are soluble. Chlorine, iodine, and bromine form derivatives of salicyl.

SALICYLURIC ACID is found in the urine after taking salicylic acid internally. It crystallizes in slender needles, having the formula $C_9H_8NO_4$, and is slightly soluble in cold water, very soluble in boiling water and alcohol. It forms crystalline salts called salicylurates.

SALIERI, ANTONIO, was born at Legnago, in the Venetian territory, in 1750. He studied music under Giovanni Pescetti and Leopold Gassmann. The latter took his pupil to Vienna, where he made the acquaintance of Gluck, who intrusted Salieri with the charge of composing "Les Danaïdes," which he had engaged to produce for the Paris Academy of Music. This work met with the most brilliant success, and Salieri afterwards brought out many operas, among which his "Tarare" and "La Grotta di Trofonio" were the most popular. He died at Vienna in 1823. Salieri was very friendly with Haydn, and was the teacher of Schubert and Beethoven. He was the only

composer whom Beethoven honoured by calling himself his pupil. On the other hand he was fiercely jealous of Mozart, and if he did not actually do him an ill turn with the Emperor Joseph, he certainly unfairly passed him over in advising the emperor musically. Nevertheless the accusation that Salieri poisoned the great composer has not a shadow of fact to support it, but it was very widely believed at the time of Mozart's death. Mozart was far too kindly natured to name any one, but he himself always thought he was poisoned. Salieri will be remembered for this ugly suspicion for ; after he would otherwise be quite forgotten.

SALINE POWDER, COMPOUND, an excellent apocient medicine and antacid, prepared by thoroughly mixing and drying half an ounce of carbonate of magnesia and in ounce each of tartaric acid, tartrate of soda and potash, bicarbonate of soda, and sulphate of magnesia. Dose, 1 or 2 two spoonfuls in water. The addition of a drop or two of lemon and a little powdered sugar to each draught will remove all unpleasant taste and enable the medicine to be taken in the form of a refreshing beverage.

SALISBURY (or *New Sarum*), a city, parliamentary and municipal borough, and market-town in Wiltshire, 83 miles W.S.W. from London by the Exeter branch of the South-western Railway, and 23 miles N.W. of Southampton. (The name of the town is pronounced *Sal'bury*.)

This city had its origin in the thirteenth century. The bishops and canons of the cathedral, which was then within the fortifications of Old Sarum (see *SARUM*), being exposed to injury from the captains of that fortress, with whom they were at feud, determined to remove their church to another site, and Richard Pauper or Poore, who held the see, having obtained an indulgence from the Pope, commenced a new church on the lands belonging to the see on the site of the present cathedral, in 1229. The inhabitants of Old Sarum, espousing the cause of their bishop and clergy, deserted it, and thus the city of New Sarum, or Salisbury, rose into existence. A charter granted by Henry III. making it a free city, and giving to the inhabitants a fair and a market, contributed to its prosperity, and in the succeeding reigns several parliaments were held there. It was fortified by a wall and ditch, and the erection of a bridge over the Avon at Hamham brought the great western and western road previously passed through Old Sarum through this town in 1244. From its position it has ever since commanded importance. In the Wars of the Roses and the Roses it was, however, a theatre of destruction. The Duke of Beaufort was here slain in its neighbourhood in 1484, by order of Richard III. During the Civil War it was successively occupied by Cromwell, Beaufort, Waller, and Charles II. It was triumphantly retaken by the Prince of Orange (William III.) on the 19th of December, 1688.

Salisbury is situated on the eastern bank of the river Avon, which is crossed by three stone bridges, and the principal part of it lies immediately to the north of the extensive Salisbury Chase. It consists of several streets, running in different directions to each other. Most of the residences are built of comparatively modern erection, and are of a fine and elegant appearance. The town is well paved, and kept remarkably clean by means of water continually running down the principal streets. The drainage is good, and the city is one of the healthiest in England. South of the Avon, where it makes a bend to the east, is the suburban village of Hamham.

The cathedral is considered one of the most beautiful in England. It was begun in 1229, and finished in 1258. The architect was Elias de Beaufort, and among its benefactors were William Longespée, earl of Salisbury, and his daughter, Ela. The spire was added in the reign of Edward III. The Close is entered by several ancient gates. The freedom of the cathedral from the encumbrance

of contiguous buildings adds much to its imposing beauty; and further, it has the advantage of being built in one style, the Early English, and from a uniform plan. The tower and spire are of later date, but admirably accommodated to the style of the building, the extreme length of which is 449 feet; width of the great transept, 203 feet; height of the interior, 81 feet; and of the spire, 404 feet. It is in the form of a double cross, having two transepts, each of which has an aisle eastward, and the nave has a large north porch. There are spacious cloisters, a chapter-house, and a tower for a library and muniment room. The exterior of the cathedral was thoroughly restored between the years 1863 and 1870. The work included not merely superficial renewals, but the strengthening of the foundation throughout, so that everywhere the security as well as the appearance of the building was regarded. The chief work, however, was the strengthening of the matchless tower and spire, so as to insure its future safety. This was fully accomplished by means of an ingenious and elaborate system of iron ties, devised by Mr. Shields, the eminent civil engineer, whom Sir G. G. Scott (under whose superintendence the restorations were made) had called in to assist him in this delicate operation. The choir of the cathedral was restored in 1873-77 at a cost of about £15,000, as a memorial to the late Bishop Hamilton. The three parish churches of the old city are large; St. Edmund's and St. Thomas' are fine buildings in the Perpendicular style. The episcopal palace contains a feudal hall built in 1460.

The Roman Catholics have a handsome chapel, and there are places of worship for various denominations of dissenters. There is a grammar-school in connection with the cathedral, and another in the patronage of the corporation. There are many other schools and several almshouses. The other public buildings are the council-house, town-hall, the infirmary, a plain and commodious building; library and news-room; St. Nicholas Hospital, founded earlier than the cathedral; a museum of much interest, and Hamilton Hall, a building erected in 1874 for the use of the literary and scientific institution and school of art.

Since 1885 the borough has only returned one member to Parliament. The population of the parliamentary borough—the limits of which were slightly extended by the Redistribution of Seats Act of 1885—is 16,435. The markets are held on Tuesday and Saturday, with large cattle fairs on alternate Tuesdays.

SALISBURY PLAIN, an extensive tract of chalk country, open and undulating, formerly a waste, but now partially cultivated, lying between Devizes and Salisbury, in Wiltshire, and measuring about 21 miles from north to south, and 15 miles from east to west. Here is located the remarkable monument of *STONEHENGE*.

SALISBURY, ROBERT CECIL, EARL OF, son of the great minister of Elizabeth, Lord Burleigh, by his second wife Mildred, was born about 1550. He was of a weakly constitution, and deformed in his person. He was educated at St. John's College, Cambridge, and during his father's life occupied several offices of trust in the queen's government, and on his father's death succeeded him as prime minister. He privately corresponded with James I., and, on his accession, was confirmed in his office. In 1603 and the few following years he was created a baron, viscount, Earl of Salisbury, and a Knight of the Garter. He was unquestionably the ablest minister of his time, though he exposed himself to considerable odium as the promoter of the disgrace and fall of the Earl of Essex, and afterwards of Sir Walter Raleigh; but he was never accused of pecuniary corruption or dishonesty. He died at Marlborough, on his road from Bath, where he had been for the recovery of his health, on 24th May, 1612.

SALIVA or **SPITTLE** is a clear watery fluid, of the following composition:—Water, 994.10; solids, 5.90. Of

the solids 2.29 are salts of various bodies, 2.13 are proteids, .07 are fats, and 1.41 is *ptyalin*, the special ferment of the saliva.

The saliva is secreted by several pairs of salivary glands, the great parotid, submaxillary, sublingual glands, and many smaller ones beneath the mucous membrane of the lips, soft palate, cheeks, and tongue. They are all racemose and lobular in structure. Saliva, as we know it, is mixed with mucus from the mucous glands, and is full of air bubbles, which make it opaque and frothy; besides it contains large quantities of cast-off epithelial scales of the lining of the mouth, &c.

The flow of saliva is brought on by the presence of food in the mouth, or by the idea or sight of food, or by its artificial injection into the stomach. Its average amount is between 1 and 2 lbs. in twenty-four hours.

Saliva serves to keep the mouth moist, and to help the tongue to move freely in speaking and eating. It dissolves rapid substances, and so renders them capable of exciting the nerves of taste; and by mixing freely with the food it renders it a soft pulpy mass, easily passed into the throat. Chemically it converts starch into glucose (grape sugar), but does not act on other substances, such as sugar, cellulose, albumen, and gelatin.

Spitting was in great favour for superstitious uses among the ancients. It guarded from charms, as we know from Theokritos—

"Thrice on my breast I spit to guard me safe
"Gainst fascinating charms."

The same reason lay at the root of the custom of the old nurses of antiquity to anoint children with spittle, and still is found in wrestlers, pugilists, and others, who "spit in their hands for luck," a custom noted by Pliny in the first century. So also hawkers of fish and fruit, &c., usually thus anoint their *handmel* or first earnings.

SALIVATION or PTYALISM (Gr. *ptyalon*, saliva) is the term used in medicine to denote a superabundant secretion of saliva. The causes which give rise to salivation are numerous, as are also the diseases of which it is a symptom, and it sometimes occurs as an idiopathic disease itself, originating without any apparent cause. Anything which causes irritation of the mucous membrane lining the mouth and entrance to the throat will give rise to salivation, and in consequence it is a prominent symptom in cases of thrush, ulcers, and excoriations of the mouth and tongue, of scorbatic and syphilitic affections of the mouth, and of the mouth troubles incident to teething. It is also very common in the confluent form of small-pox, in hysteria, facial neuralgia, pregnancy, and some forms of indigestion. The most common form of salivation requiring medical treatment, however, is that brought about by the use of certain drugs, notably mercury and iodine. When the affection is due to mercury the first evidence of the constitutional effect of the drug preceding salivation is the presence of a disagreeable metallic or "coppery" taste in the mouth, a fetid odour being at the same time observed in the breath, together with some degree of tenderness in the gums of the upper jaw. If after these signs are apparent the use of the drug is persisted in, the gums become soft, spongy, and swollen, they are apt to bleed on very slight abrasion, and there is a profuse flow of saliva, while continued persistence may lead to rapid emaciation and serious constitutional disorder. In such cases the use of the medicine must be entirely suspended, and mild astringent mouth washes and gargles should be used frequently. Those composed of chlorate of potash, alum, tannin, or acetate of lead in solution are the best for this purpose. The treatment is aided also by securing fresh air, nutritious diet, and by attention to the state of the bowels.

SALLUST, or CAIUS SALLUSTIUS CRISPUS, was born B.C. 86, at Amiternum, a town in the country of the Sabines, of a plebeian family. He was tribune of

the people B.C. 52, in which year Clodius was killed by Milo. Sallust was a strong opponent of the aristocratical party, and in his tribuneship took an active part in the proceedings against Milo. In B.C. 50 he was expelled from the senate by the censors Appius Claudius and Piso, in consequence, it is said, of his immoral life; but there is no good authority for this accusation, and we know that Appius Claudius belonged to the Pompeian party, and that Sallust only shared the fate of all the absent Cæsar's friends. He was prætor in B.C. 47, and was present at the mutiny of Cæsar's troops in Campania, on which occasion he narrowly escaped with his life. He accompanied Cæsar the same year into Africa, where he was actively employed in the war, and when the great general quitted Africa in B.C. 46, he left Sallust governor of the province, where, according to Dion Cassius, he acquired immense wealth by the plunder of the country. On his return home, Sallust built his famous palace and gardens on the Quirinal at Rome, which were afterwards used by the emperors. He lived then so quietly as to pass unharmed through the stormy period after Cæsar's death. He died B.C. 34.

In his retirement he devoted himself to historical composition, and wrote a history of Cato's conspiracy ("Bellum Catilinarium"), and of the war with Jugurtha ("Bellum Jugurthinum"), and also a general history of Roman affairs from the death of Sulla, B.C. 78, to the appointment of Pompey to the command of the Mithradatic war, B.C. 67 ("Historiarum Libri Quinque"). The two first works have come down to us entire, but of the latter we have only fragments. There are also works of less importance extant by this author.

In estimating the value of Sallust's writings it should be borne in mind that the Romans possessed no works worthy of the name of histories before his time. Preceding writers merely narrated events according to the order of the years in which they happened, without any attempt to trace the causes and results of these events. Sallust studiously avoided the annalistic style of his predecessors, and appears to have made Herodotus his model. The fastidious critics of the Augustan age objected to the use of the antiquated expressions which he sometimes employed, but it is no small proof of the excellence of his style that Tacitus closely imitated it. The "Catiline" is very valuable as a fairly impartial record of contemporary history; but the "Jugurtha" was based on literary and documentary evidence, and was treated in an epic style throughout. Dates and geography are not infrequently at fault, and the excellent speeches introduced are probably of Sallust's own invention. Nevertheless it is extremely valuable, and on the whole no doubt gives a faithful and somewhat highly coloured picture of those times.

The first edition of Sallust was published at Venice in 1470. The edition of Cort, which was published at Leipzig in 1724, 4to, with a valuable commentary, has formed the basis of most subsequent editions.

SALLY-PORT, the gate or passage of a fortress by which its defenders might attempt a sally (Lat. *salo*, I leap) or a sudden assault on their besiegers. It is now generally understood to be a cutting through the glacis which permits of a sally from the covered way.

SALLASIUS, CLAU DIUS, the Latinized form of his real name, *Claude de Saumaise*, a celebrated French scholar, was born near Sémur in Auxois, in the year 1588. He was educated at home by his father, and is said to have made such progress as to be able to read Pindar at ten years of age. At the age of sixteen he was sent to Paris to prosecute his studies, where he became acquainted with Casaubon, by whose influence he was induced to embrace the Reformed faith. From Paris he repaired to Heidelberg, where he made a formal renunciation of the Roman Catholic religion. He settled at Leyden in 1632,

where he received a public salary, but did not discharge any duties as professor. He died in 1658.

His name would now be scarcely remembered but for its association with the far greater name of Milton. In 1649 Salmasius was selected by Charles II. to plead his father's cause against the people and Parliament of England. This Salmasius did in his "*Defensio Regia pro Carolo I.*," for which he was paid one hundred Jacobuses (about £125 sterling). The work was circulated with great industry, and was deemed so important by the supporters of the Commonwealth that, on the 8th of January, 1650, an Order in Council was issued—"That Mr. Milton do prepare something in answer to the book of Salmasius, and when he hath done it, bring it to the Council." The result was Milton's magnificent "*Defence of the People of England*," for which Milton refused to receive a penny, lest he should be suspected of having defended the cause he had espoused for hire, as Salmasius had done. To this work Salmasius prepared a reply, which was not published. However, till after the Restoration.

SALMON (*Salmo*) is a genus of fishes belonging to the family SALMONIDÆ, under which heading the characters of the genus are given. This large genus is divided by Günther into two sections: *Salmones*, containing the salmon and the various species known as trout; and *Salvelini*, containing the CHARBS, chiefly small forms from fresh-water lakes. The first group is distinguished by having teeth on the body of the vomer as well as on its head, while in the charms the head of the vomer alone is provided with teeth. Some of the species interbreed, and the hybrids are fertile with either of the parent forms.

The largest and most important species is the Common Salmon (*Salmo salar*), which may justly be considered the king of British fishes. When in fine condition he is conspicuous for his shining silvery mail, his compact, graceful form, his strength, swiftness, and agility, which bear him forward and onward through impetuous torrents and foaming cataracts, up to the very sources of mountain streams. His admirable edible qualities render him a favourite at every table; the exciting sport he affords endears him to the angler, while his strange dual existence in the fresh and salt water, and the remarkable circumstances attending the transformation of the parr into the smolt, the smolt into the grilse, and the grilse into the perfect salmon, afford matter for curious and interesting speculation to the student of natural history.

The salmon may attain a weight of 70 or 80 lbs., but owing to the injudicious system of fishing in vogue none much exceeding 30 lbs. are ever brought into the market, and even such a weight is uncommon. The body is slender and fusiform, with the head large, the snout pointed, the gape very wide and well furnished with teeth. The head and back are slaty blue, and the belly is silvery white; the black spots which extend along the body above the lateral line are more numerous in the female than in the male; the dorsal, pectoral, and caudal fins are dusky black; the anal is white, and the ventrals are white on the outer side, dusky on the inner. The gill-covers are rounded posteriorly. The tail is forked in the young, but becomes nearly square in the adult. The salmon is widely distributed in northern and temperate Europe, as far southwards as 43° N. lat.; it is not found in any of the rivers falling into the Mediterranean. In North America it is abundant down to 41° N. lat.

Generally speaking, it is in the latter end of autumn and in the earlier months of winter that salmon ascend to the gravelly streams in the upper reaches of our rivers for the purpose of spawning. The ascent takes place in some rivers earlier than in others—from causes not fully decided, but probably owing to conditions of temperature and local circumstances. Sometimes salmon ascend rivers in the spring, and even return in some cases to the sea before

the regular autumnal migration. The females ascend the rivers before the males, and the young on their first return from the sea before the adults. Arrived in the chosen locality, a bed of fine gravel in shallow water, a furrow is excavated in the sand by the tail of the female, and in it the ova are deposited and fertilized by the male. It has been calculated that each female salmon contains about 900 ova for every pound of her weight; but the ova after being deposited in the stream, and the young fry when hatched, are exposed to many dangers from floods and from the attacks of pike, trout, sea-gulls, herons, and other enemies. So great is the destruction thus wrought that excellent authorities have asserted, after careful investigation, that only one egg out of 3000 ever becomes a marketable fish. By artificial hatching, on the other hand, such as is carried on at Stormontfield and other places, out of 3000 eggs at least 1000 smolts may be sent down to the sea—a fact of no small weight in proving the utility of artificial hatching.

When the fish have gained the upper and shallow pools of the river, preparatory to the important operation of depositing the spawn in the gravelly beds, its colour will be found to have undergone considerable alteration during its residence in fresh water. The male becomes marked in the cheeks with orange-coloured stripes, which give it the appearance of the cheek of a Labrus; the lower jaw elongates, and a cartilaginous projection turns upwards from the point which, when the jaws are closed, occupies a deep cavity between the intermaxillary bones of the upper jaw; the skin of the back becomes thickened and spongy; the body acquires a golden orange tinge, and the salmon in this state is called a Red Fish. The females are dark in colour, and are as commonly called Black Fish; and by these terms both are designated in those local and precautionary regulations intended for the protection and preservation of the breeding fish. The curious hooked lower jaw of the male at this season was at one time thought to be a provision for digging out the trench in which the female was to deposit her ova. It has been ascertained, however, that the male takes no part in the formation of this trench. As tremendous fights take place between the males on the spawning beds, the hooked jaw has probably been acquired as a special defensive weapon.

The spawning period lasts from three to twelve days, at the end of which time the fishes are much emaciated and totally unfit for food; in this state they are called "kelts," and their capture is prohibited by law. They revisit the sea generally in early spring. In making both journeys the salmon remain for a time in brackish water, for the purpose, it is supposed, of freeing themselves from their parasites.

The eggs are hatched in about 114 days when the temperature of the water is at 36° Fahr., in about ninety when it is at 45° Fahr. They are killed by too high a temperature, and also by salt water.

The process of hatching is one of great interest, and as much attention has been devoted to it both in England and Scotland, it has been carefully observed and the various stages distinctly noted. After a time the egg swells a little; then two specks, the future eyes, make their appearance; the fish is after a time seen coiled up in the egg; it then begins to emerge from the shell by a longitudinal rent. When first hatched they are nearly transparent, with a continuous fin round the body and the yolk-bag attached to the abdomen. In six or eight weeks the young salmon appears as a small fish not more than an inch in length, light brown, with nine or ten dusky bars, and forked tail. The fry are then known as *parr*. It was long denied that the parr and the young salmon were the same, but it is now settled that they are so. What chiefly led to the unwillingness of naturalists to believe this was the extraordinary fact that many of the males possess a perfect milt, though the female is destitute of a perfect roe. It is not accurately

known whether these parr can impregnate the ova of female salmon.

The growth of a beautiful coat of silver mail marks the transition of the parr into the *smolt*, and it is then led by an irresistible instinct to descend as rapidly as possible from the fresh to the salt water. The transition takes place, in the case of many of the parr, in or soon after the first year of their life; but the majority, and the males almost entirely, are not ready for their emigration before the second or even the third year of their age. The shining armour, the appearance of which seems to indicate the transition from the parr stage, probably forms a good protection against the effects of the new element to which the fish emigrate. The smolt now lives, thrives, and grows with marvellous rapidity in the salt water; whereas the parr, though apparently quite as hardy a fish, speedily dies. Parrs placed in sea-water at first become restless, as if suffering pain, change their colour, languish, and die. Arrived in the sea the smolts soon develop into *grilse*; and when these return to the sea after having reascended the rivers, they become full-grown *salmon*.

Nothing is more remarkable in the natural history of the salmon than its wonderfully rapid growth and development in the sea. The tiny smolts that have taken one, two, or even three years to grow the length of a man's finger, go down to the sea and return to the river in six or eight weeks as grilse of from 3 to 5 lbs. weight, or even of 8 or 9 lbs., after a somewhat longer sojourn in the salt water. The grilse is generally believed to spawn on its return to the fresh water, after which, on again descending to the sea, it assumes the characteristics of the mature salmon, and goes on gradually increasing in size at each of its annual migrations to the sea.

It is a generally received opinion that a wonderful and unerring instinct leads the salmon, after his descent to the sea, to return to the river in which he was bred. It is probable, however, that salmon do not *always* ascend the river in which they have been bred in order to spawn. It is proved that they sometimes rove for miles along the shore; and it is therefore not improbable that when salmon have wandered far from their native stream they may, at the breeding season, ascend another river, provided its temperature and conditions are congenial.

Salmon attain to great size and weight. As a rule the largest fish are found in the largest rivers; but very heavy fish are got in comparatively small rivers, especially in some of the minor tributary streams of Scotland. Yarrell mentions one of 83 lbs. as having come into the possession of Mr. Groves of Bond Street; and the museum of Mr. Buckland comprised about a dozen salmon weighing from 42 lbs. to 70 lbs., and measuring from 3 feet 8 inches to 4 feet 8 inches in length.

Salmon swim with great rapidity, and in ascending rivers make astonishing leaps, as much as 14 feet out of the water in overcoming obstacles. They ascend the river during the flood at the rate of from 15 to 25 miles a day. In some rivers they are enabled to ascend high weirs by means of fish-ladders, which offer a succession of leaps. The chief food of the salmon seems to be small crustaceans and the eggs of echinoderms, to the first of which its flesh owes its peculiar pink colour, and to the latter its delicate flavour. It also feeds largely on the launces or sand-eels (*Ammodytes*); and in rivers on minnow, the fry of its own species, and other fish, flies, &c.

In the sea salmon rarely, if ever, bite at a hook, but in a river angling for salmon with artificial flies, worms, or minnows furnishes the best of sport. The Thames was at one time noted for the excellence of its salmon, but at length the waters round London became too foul to permit its ascent into the upper reaches. The last salmon caught in the Thames was taken, according to Yarrell, in 1833. In Scotland many rivers, especially the Tay and Tweed, are

celebrated for their salmon, and parts are preserved and rented to anglers. The rivers of Norway are also much frequented by British sportsmen.

Spearing salmon, as formerly practised in Scottish rivers, is now illegal. The most usual way of capturing them for commercial purposes is by means of the seine net. Dogs have sometimes been trained to drive salmon into nets.

The salmon fisheries, which may be truly regarded as a valuable national property, and which in early times were watched over and encouraged by the legislature, had through improvidence and neglect been suffered to decline in England and Wales to such an extent that had not timely measures been adopted for its recovery, the total extinction of the salmon from English waters was threatened. Happily, however, the destruction which threatened this most valuable industry was arrested in the year 1861, when the government, acting on the advice of the royal commissioners, framed new laws for the better regulation of the salmon waters. The Act was amended in 1863, 1865, and 1873; and owing to the judicious provisions of these Acts a gradual and progressive increase in the yield of salmon took place until it became no less than four times as great as it was before the Acts came into force.

The salmon fisheries of Ireland, which are of greater value than those of either England or Scotland, are regulated by the Salmon Fisheries (Ireland) Act, 1863. Ireland, like England, is divided into fishery districts, with boards of conservators, clerks, and water bailiffs. Scotland, by Acts passed in 1862 and 1868, is divided into fishery districts, which are managed by district boards constituted in conformity with directions in the Act. The salmon fishery legislation of Scotland is, however, rather complicated, owing to the omission to repeal many old laws, some dating so far as 100 years back.

In Scotland all salmon fisheries are vested in the crown or grantees of the crown; in England, on the other hand, the public have a right to take salmon in the sea or in navigable rivers, except where an exclusive claim has been established by long usage.

The main features of the Salmon Acts are the placing the fisheries under boards of conservators, who have power to make bye-laws for the better protection of the interests confided to them; to issue licenses for fishing, and to define the dates of close times for the waters under their care, during which times it is unlawful to take fish from their particular rivers. The Acts prohibit certain modes of capturing the fish, and provide against such pollutions as may destroy them; they provide for certain gaps being kept open in weirs, so as to facilitate the ascent of the salmon; and for the meshes of nets being of such a size as not to interrupt smolts or salmon-fry. Inspectors are appointed (except in Scotland) to see to the due observance of the conservators' regulations. The annual close time is from 1st September to 1st February (for anglers from 1st November), and the weekly close time thirty-six hours in Scotland, forty-two hours in England, and forty-eight hours in Ireland. The close time can be varied according to local circumstances by bye-laws.

Salmon nurseries are now established on many of the principal rivers; those of Mr. Buist, of Stormontfield, on the Tay, near Perth, of Mr. Dunbar, lessee of the Thurso River, and of the Duke of Sutherland, being among the most successful. We have already given one fact illustrative of the value of these operations—that of at least 1000 smolts being obtained from 3000 eggs; while, had the ova been left for hatching in the natural manner, there seems every reason to believe that only *one* egg out of the whole quantity would have survived the dangers of its early existence, and have developed into a marketable fish. Trout are by no means the most formidable foes to the spawn and youthful fry of the salmon; but even from the stomach of a trout weighing only 2 lbs. Mr. Dunbar once took no

less than 500 salmon ova. ("Sea and Salmon Fisheries," by Messrs. Holdsworth & Young; London, 1878.)

In Australia and Tasmania the recent attempts to acclimatize the salmon have met with considerable success.

The *Salmo hamatus* of Cuvier, with a hooked lower jaw, is now considered to be merely the old male of the common species. The Hucho of the Danube (*Salmo hucho*) has the body longer and rounder than the common species. The upper parts are grayish-black, tinged with violet, the sides and belly being silvery; the head and dorsal fins have a greenish tint, and the other fins are yellowish. It attains a weight of from 30 to 40 lbs. It spawns in June. The flesh is white and soft and less agreeable than that of the common species. The Arctic Salmon (*Salmo rossii*) is abundant in the Arctic Ocean and the rivers that drain into it. The body is slender, the back brownish-green, the sides pearly-gray, and the belly red.

The smaller species of *Salmo*, to which the name *Trout* is applied, are noticed under that heading.

SALMONIDÆ is a large and important family of fishes, belonging to the order *Physostomi*. In this family the body is covered with scales, which are very small and deciduous in the Chinese Whitebait (*Salanx chinensis*); the head is always naked. A second dorsal fin is always present; this is the adipose fin, a mere fold of the skin inclosing fat and without rays. The margins of the upper jaw are formed partly by the maxillary and partly by the premaxillary bones. The pyloric appendages of the intestine are generally numerous. The air-bladder is large and spongy. Pseudo-branchiæ (embryonic gills) are present. The ovaries are closed sacs, and the eggs fall into the cavity of the abdomen before exclusion. The Salmonidæ are inhabitants of both fresh and salt waters. The fresh-water forms are confined to the temperate and northern parts of the Northern Hemisphere, one occurring in New Zealand. Many of them periodically descend to the sea. The marine forms are chiefly inhabitants of the deep sea. Many of the Salmonidæ are esteemed for food, and some, as the salmon, are among the most valued of fishes.

The typical genus *Salmo*, which contains the Common SALMON, TROUT, &c., has the body covered with small scales; the cleft of the mouth wide, the jaws, vomer, palatines, and tongue armed with conical teeth; the young of all the species are banded with dark bands. Other genera are *Osmerus* (SMILT), *Milotus* (CAPLIN), *Coregonus* (POLLOCK, POWAN, &c.), *Thymallus* (GRAYLING), *Argentina* (ARGENTINUS).

SALO, GASPARD DI, often called the inventor of the violin, was either really so, or at all events one of the very first makers. His violins show the characteristic change in pattern which marks the new instrument as distinguished from the *rebek*. His models are usually large and very sonorous, and it is remarkable that the first violin maker should be among the best. Gaspar's tenors and double basses, though cambrous in size, are simply univalued for power and quality. They hold their own against even Stradivari and Guarneri. For instance, Ole Bull always used a Gaspar when playing in the vast hall at Moscow. Gaspar is believed to have been born at Salo on the Lake of Garda (whence his surname), but his life was spent at Brescia. His own instruments and those of his imitators, are therefore said to be of the Brescian school.

SALOMON or SOLOMON ISLANDS, a group in the Pacific, between the Queen Charlotte Islands on the east and New Britain and Papua on the west. They consist of six principal islands—Bougainville, Choiseul, Ysabel, Malaita, Gea or Guadalcanal, and Banno or San Christoval—besides very numerous smaller islets, and stretch north-west to south-east for about 600 miles. They are generally of a lofty interior, with volcanic mountains, and are fringed with coral reefs. The inhabitants are Papuans, in a very savage state. They were reached in 1567 by Alvaro Men-

dana, who landed on Ysabel and took possession of that island for Spain. He called them Salomon's or Solomon's Islands, to induce the belief that Solomon had sent thither for gold, and thus to attract notice.

SALONICA or SALONIKI (*Thessalonica*), a large seaport city, and, next to the capital, the principal seat of commerce in European Turkey, is situated at the north-east extremity of the Gulf of Salonica. The inhabitants number, it is believed, about 70,000, including from 25,000 to 30,000 Jews and 5000 Turks, the remainder being Greeks and Franks. The town stands on a hill slope, inclosed by walls 5 miles in circuit, and is commanded by a large citadel termed the Seven Towers. Its numerous minarets and domes are interspersed with gardens of cypress, and it contains many antiquities in good preservation. As seen from the sea the town presents a very beautiful appearance. Within the citadel is a triumphal arch, erected under Marcus Aurelius. Several of the mosques were originally Pagan temples; one has been constructed on the model of the Pantheon at Rome, and another, of which portions still remain uninjured, was formerly a temple of Venus. In the centre of the city is the hippodrome, a noble area, entered by a magnificent colonnade of five Corinthian pillars. The Mosque of St. Sophia is a handsome model of that at Constantinople. The bazaars are extensive and well supplied, and there are some flourishing silk-drawing factories. The situation of Salonica, almost equidistant from Constantinople and Smyrna, rendered it at the beginning of this century, especially when most European ports were closed to British commerce, the principal emporium for the rich produce of the Levant. The principal articles of trade are wheat, barley, maize, and other corn, timber, wool, cotton, sponges, raw silk, wine, sesamum seed, and tobacco—the produce of the surrounding country, which is of great fertility and tolerably well cultivated, agriculture here not being so backward as is generally stated. There are some rich lead and iron mines in the district of Salonica; but this branch of industry is not profitable, owing chiefly to the ignorance of the people in the art of working mines with economy. The railway from Salonica to Metrovitz, about 200 miles, was completed in 1875, and the very convenient quay in 1876. In the latter year there occurred here an outbreak of Mussulman fanaticism, resulting in the murder of the French and German consuls.

Thessalonica was at first an inconsiderable town under the name of *Therma*, by which it was known to Herodotus, Thucydides, and Æschines. Xerxes stayed here some days with his army and it was occupied for a short time by the Athenians during the Peloponnesian War. According to Strabo, Cassander changed its name to that of his wife Thessalonica, the daughter of Philip and sister of Alexander the Great. After the conquest of Macedonia by the Romans it was made the capital of the second of the four districts into which that country was divided; it was the residence of Cicero during a part of the time he continued in exile. Valerian raised it to the rank of a colony; and it had an amphitheatre, a hippodrome, and numerous splendid public buildings. It is also interesting from its connection with the early history of Christianity, having been visited by St. Paul, who made many converts, to whom he addressed the Epistles to the Thessalonians.

SALPIDÆ is a family of *Tunicata*, allied to the Ascidians. The Salps are free-swimming, transparent, oceanic animals, with a cylindrical, somewhat flattened body. The anterior extremity of the body is somewhat rounded, and pierced by the mouth, a broad transverse slit provided with valve-like lips. At the other extremity of the body, which is pointed, is another large aperture, the atrial. The mouth leads into a large branchial cavity, which communicates with the atrium by a single very large gill-slit on each side. In the wall of the branchial cham-

bers is a mucous gland (endostyle), and below a ciliated groove, along which the food passes down to the œsophagus. The alimentary canal, together with the heart and reproductive organs, are aggregated into a single mass called the nucleus, situated at the ventral side of the hind end of the body. There is a large nerve-ganglion situated at the anterior extremity of the body, and giving off numerous nerves; on it lies an eye-spot. Muscular transverse bands embrace the body and, by their contractions, forcing the water out of the atrial aperture, propel the animals in the opposite direction.

The salps are remarkable for displaying the phenomenon of alternation of generations. Two separate forms are known, the one solitary, the other united in chains, often of many feet. The solitary forms are asexual, and produce by budding on a stolon, which is given off near the nucleus, a winding chain of individuals, which become detached and swim near the surface of the sea with a serpentine motion. These chain-salps are hermaphrodite, but the male organs are not ripe till after the female organs have attained maturity. The fertilized egg undergoes its first development in a brood-pouch in the atrial cavity, and is connected with the parent by a placenta. When set free it has the form of a solitary salpa, and by budding on its ventral stolon reproduces a progeny like to its own parent. The solitary salpa is from $\frac{1}{2}$ inch to 10 inches in length. The chains may extend to many feet in length, but seem always to break up after a time, so that the adult chain-salps become detached. The Salpæ are found in considerable numbers in the Mediterranean, and take part in producing phosphorescence in that sea. A nearly allied genus, *Dobolium*, with a cask-shaped body and bands of muscles forming complete hoops, is also found in the Mediterranean. The branchial chamber is pierced by numerous gill-slits. There is a complicated alternation of generations.

SALSAFY or **SAL'SIFY** (*Tragopogon porrifolius*), a triennial plant rarely met with in England, but growing in meadows throughout the European countries. The root is edible, and has a flavour resembling that of asparagus. It is white and fleshy, yielding a milky juice. The leaves may be compared to those of a leek; the flowers are of a dark purple. The genus *Tragopogon*, which includes the Yellow Goat's Beard (*Tragopogon pratensis*), is included in the tribe Cichoriaceæ, of the order COMPOSITÆ.

SALSETTE, a large island to the north of Bombay, extending 16 miles from Bhandara northwards to the Bascin inlet. The area is 150 square miles. It is connected with Bombay Island by a bridge and causeway. The sea-face is fringed with islands, and is distinguished by several remarkable peaks. The central and highest, Thana (Tanna) Peak, is a flat-topped hill, 1530 feet high. This beautiful island is rich in rice-fields, diversified by jungles and studded with hills. The ruins of Portuguese churches, convents, and villas attest its former importance, and its antiquities at Keneri still form a subject of interest. It was seized by the Portuguese early in the sixteenth century, and should have passed to the English, together with Bombay Island, as part of the marriage portion of the queen of Charles II. The Portuguese in 1662, however, contested its alleged transfer under the marriage treaty, and it was not till more than a century afterwards that the English obtained possession of it. The cave architecture of Salsette deserves notice. It belongs to the beginning of the fifth century. Salsette had a sanctity of its own early in the fourth century as containing a tooth of Buddha, at the period, says Ferguson, "when these relics were revolutionizing the Buddhist world—at least at two diametrically opposite points of the coast of India, at Puri and in this island." In consequence of its being an island it remained undisturbed by the troubles of the mainland, and the practice of excavating caves lasted longer here than elsewhere.

SALT (Germ., Span., Ital., Fr., &c., from the Latin *sal*). In nearly all European languages salt is a word of general application to the most useful condiment in nature, which, as a necessary of life and a seasoner and preserver of food, has been known and appreciated from the earliest ages.

Common salt is composed of chlorine and sodium, and is known, in chemical language, as chloride of sodium. It is found in inexhaustible abundance in nature, both in the solid state as rock salt, and in solution in sea-water, salt lakes, and salt springs; also in smaller quantities in river water. Mines of rock salt have been recently explored in the Caucasus, in which the stone implements were found as they were left by the workers at a date so remote that no tradition exists of the time when they were worked. The mines of Wieliczka in Austrian Galicia have been worked for at least six, but probably for upwards of eight centuries, while the springs of Droitwich, in England, were worked by the Romans, and "the Wiches," in Cheshire, were very productive in the reign of Edward the Confessor. Little is understood of the origin of rock salt. Some beds, as those of Cheshire, appear to have been produced by the drying up of bodies of sea-water cut off from the ocean, while in other cases, as at Bex, where the salt forms a perpendicular vein, its origin is altogether obscure. Salt lakes are derived either from the partial drying up of isolated bodies of sea-water, as the Dead Sea, or by the evaporation of lakes without outlets and fed by streams which have passed over beds of salt or plains impregnated with it, as the Great Salt Lake of the United States Lake Urmiah in Persia, and many of the lakes of South America. Saline incrustations often overspread the surface of plains in Russia, India, the South American pampas, and the regions east and west of the Rocky Mountains. The waters of the open ocean contain on an average 33·8 parts of salt in 1000, of which 26·8 are common salt, equal to about 4 oz. to a gallon of sea-water, or a bushel of salt to every 300 or 350 gallons of water. The water of landlocked seas like the Mediterranean contains more salt than that of the open ocean, and it is also found that the water of the bottom of such seas is saltier than that upon the surface. The entire quantity of salt in the ocean is estimated by Schaffhault at 3,051,342 cubic geographical miles, or about five times more than the mass of the Alps.

Rock Salt.—The deposits of rock salt which occur in the earth's crust, and the brine springs which at various places rise to its surface, appear to be confined to no particular series of strata, but to be distributed somewhat indiscriminately. Thus, the inexhaustible mines of Wieliczka in Galicia, the deposits at the base of the Carpathian mountains, as well as in many other parts of Central Europe, are found in the Tertiary; in some parts of Germany, again, salt is obtained from strata equivalent to our New Red Sandstone; in the Austrian Alps an impure deposit, mixed with clay and gypsum, occurs in Oolitic limestone; whilst in many countries, and even in England, salt springs burst out of the Carboniferous and older rocks.

The great English deposits, however, exist in the upper members of the New Red Sandstone, and lie both in Cheshire and Worcestershire in a basin of Lias; at Northwich, in Cheshire, at a depth of about 120 feet, a bed of rock salt exists 60 feet in thickness, 1400 yards in breadth, and a mile and a half long; and from a bed still lower salt has been removed to a depth much exceeding double this. In Worcestershire the deposits, although large, do not appear to be on so gigantic a scale, and the Cheshire salt-beds, which have an area of 80 miles in length by from 10 to 15 miles in breadth, furnish most of the salt used in England. The mining operations concerned in the getting of rock salt are of a very simple description. A shaft like that of a coal-pit is sunk to such a depth as the position of the rock necessitates, and galleries are worked from this. In

the mines of Galicia, which have been worked, as we have said, for centuries, some enormous excavations have been made. It is said that in one mine the workings are over 30 miles in length, and that the salt in some places has been cut away so as to form great halls 100 feet in height. In the galleries of the Cheshire mines a height of 16 feet is considered sufficient, and the great monster mine at Northwich has been excavated to this height over an area of about 40 acres. The roof is supported on huge square pillars of the native rock left at regular intervals of about 10 or 12 yards by the excavators, the roof and floor being both cut level. When this mine is lighted up by thousands of candles it presents a striking appearance, the crystalline walls reflecting the light in all directions. At Northwich the rock is found very compact and hard as a rule, and as it is not stratified like coal it is difficult to work with the pick, and in consequence most of it is obtained by blasting, the miners beginning at the top of the working and proceeding downward. The rock is undercut horizontally to a depth of three feet by a compressed air-cutting machine to facilitate the blasting. In England the rock salt was formerly dissolved and purified, but now brines of great purity and strength, and in unlimited quantity, may be obtained at so little cost, that recourse is seldom had to rock salt for food purposes. Much of it is used for manufacturing purposes, and the remainder is mostly exported.

Salt Springs and Wells; Brines.—A fresh-water spring passing over a bed of rock salt becomes impregnated with that substance, and there results a salt spring or well. Salt wells are also made artificially by pumping water into excavated salt mines. In England all the salt prepared is obtained from the evaporation of strong brines by artificial heat. The brines used are saturated, or nearly saturated solutions of salt in water, and contain from 23 to 26·5 per cent. of pure chloride of sodium, besides other constituents; while a saturated solution of salt in water only contains 27 per cent. of salt. Indeed, several experiments tend to show that some brine springs would seem to hold in solution more chloride than would be taken up by the same amount of water, however long it were left in contact with dry salt. The brine springs of Cheshire do not rise to the surface of the ground. They emerge from the surface of the rock, and when the spring is tapped, will rise in the bore hole from 80 to 90 feet. In the neighbourhood of Winsford and Northwich, a shaft is sunk in the ground 6 feet square and about 180 feet deep. The sides of the shaft are carefully boarded with planks, and an inner planking of 6-inch boards 4 feet square is then built in, and the space between the boards well padded with clay to keep out any surface springs of fresh water. The inner boarding is firmly built in, and made more secure by cross-stays of stout wood. An iron pipe about 9 inches internal diameter is then let down into the shaft. The brine will rise in this pipe about 90 feet, and be consequently to be lifted by a pump to about the same extent. A continuation of the pipe from the pump conducts the brine into a large reservoir lined with masonry. This reservoir, which may be about 200 feet long by about 60 or 80 broad and perhaps 6 feet deep, is not built for the purpose of allowing sedimentary matters to deposit, for the brine as it is pumped up is perfectly clear and free from particles in suspension. It is of a clear sea-green colour, and the reservoirs are built to serve merely as a store of brine on a high level, from which it may be drawn down to supply the evaporating pans as needed.

The evaporating pans are contained in a shed which may be about 400 feet long by 80 broad, and about 30 feet high, open at the sides to permit a free current of air to pass over their surface. The pans are set in a firm foundation of brickwork, which does not, however, extend up the sides. There are usually three pans in a series, under two of which, furthest removed from each other, are the

fireplaces. The flues passing under these are continued under the third, and meet in the centre, at which point they unite into one, and the flue is connected with the chimney; but in order to economize as much as possible the heat of the flue, a chamber is built in its course to the chimney, and this is made use of as a drying stove for the squares of salt.

The Cheshire brines, which are of specific gravity 1·200, and contain about 24 per cent. of common salt, are of so pure a quality that they require no preliminary concentration. The brine is therefore at once run into the evaporating pans, which are of sizes varying with the source of heat, and evaporated by the direct action of the fire, or by the waste heat of the steam-engine used to pump up the brine.

Those pans in which the salt is evaporated by a boiling heat, are about 20 feet square and 18 inches deep; those where a lower temperature is used are about 40 to 60 feet long by 20 broad, and 2 feet deep. The pans are made of $\frac{1}{2}$ -inch iron boiler-plates rivetted together. They incline somewhat towards the end furthest removed from the fires, that more salt may be deposited on that part. The inclination is from 6 to 8 inches in the whole length.

The evaporating processes are conducted as follows:—Brine is run into a pan until it is three parts full; a little glue, and sometimes a little waste grease, is then thrown in to assist in the formation of a scum, and partly to prevent the crystals of salt, as they fall, from adhering to the bottom of the pan. The brine is then brought to the boil as rapidly as possible, and a scum which forms on the top is removed by lightly skimming the surface with a piece of board. The crystals of salt begin to separate almost as soon as the brine is brought to the seething point, and when about half the water has been evaporated fresh brine is run in. The salt that has boiled out is removed twice in the twenty-four hours. This operation is effected by a perforated scoop, and the salt is put into wooden moulds or tubs about 18 inches high and 9 inches broad at the top, and diminishing to about 7 inches at the bottom. These tubs are put into the salt-pan to be filled, and stand on a ledge on the side about 6 inches from the bottom of the pan. When the tubs are filled the salt is slightly pressed down, and the tubs are removed from the ledge on to a perforated floor, so that the mother liquor may drain away from the salt. To allow of this there are two slits in the bottom of the tub. When the salt in the tubs has drained twelve hours, the tubs are reversed and then withdrawn from the squares of salt, which are removed to the drying chamber, where they are allowed to remain until they become dry. From a salt-pan 20 feet square, 200 tubs of salt, each containing 30 lbs. of dry salt, are removed in a day. The pans are not allowed to cool, except for purposes of cleansing, the brine being repeatedly pumped in, and the process of evaporation being continuous. Three kinds of salt are manufactured in Cheshire; the difference, however, consists in the size of crystal, depending upon the rapidity with which the evaporation is conducted. Thus, the fine-grained salt, known as stoved or fine table salt, is made by rapid boiling; the coarsest, called bay or fishery salt, at a temperature of about 150° Fahr.; and the medium quality, termed common salt, between these two points.

When the brines are very weak, they are always made to undergo a preliminary evaporation in the air; and when the presence of sulphates and the chlorides of calcium and magnesium are calculated by their quantity to impair the commercial character of the product, certain purifying processes are had recourse to by which these are removed. When ferrous carbonate is present in the weak brine, it is generally got rid of by exposing the brine for some time to the air. The process of evaporation with weak brines is carried on in France and Germany in what are termed

graduating houses. These are large wooden structures, from 800 to upwards of 5000 feet long by about 40 feet broad, covered over at the top, and open at the sides to allow a free circulation of air through the interior. The roof covers and protects from the rain several very large but shallow wooden cisterns intended to receive the brine, or there may be only one cistern, divided by wooden partitions into several separate compartments; but the extent of these divisions, their collection under one roof, or their separation, are determined by circumstances purely local, such as the character of the water, or indeed the motive power available in distributing it. The several compartments are used to contain the brine in different stages of concentration. The first is intended to receive the brine itself; the second to receive the same after it has been concentrated by exposure to the air in minute streams, &c. The position of these graduating houses is such that they shall be exposed in the direction of their greatest length to the prevailing winds.

In 1874 it was demonstrated, by a bore-hole being put down, that salt underlay part of South Durham; but not till 1881 was it decided how the bed of salt should be utilized, and how it should be raised to the surface from its depth of 1200 feet. The method of reaching this salt was first by what is called the "diamond borer." This borer ends in a hollow crown, in the outer edge of which are set carbonate crystals, and the rapid revolution of this crown cuts through the earth-strata and extracts a cylindrical core. A wrought-iron tube is put in from the top to the bottom of the bore-hole, the lower portion, through the salt-rock, being pierced with apertures. An inner tube is placed within the outer. Now fresh water is allowed to run in the annulus between the outer and inner tube, and at the bottom finds its way through the holes to the salt; it thereby becomes saturated, and, as brine, rises in the inner tube nearly to the level of the inflowing water, whence it is pumped to the surface, and thence to reservoirs. This boring of the ground is costly and comparatively slow, and of late an attempt has been successfully made in South Durham to introduce the cheaper and quicker method in use in the oil region of the United States. In such a manner one bore-hole has been put down about 1180 feet in less than three weeks, and at only a part of the cost of the former methods. In reality, whichever of these methods is adopted, it is to water that the task of bringing up the salt in the form of brine is intrusted; and that water having done its work, the next thing is to get the salt out of it. A thousand gallons of water poured down into the salt may take up some 28 cwt. of it, but when water thus holds salt in solution, it has a tendency at times also to take up earthy matters, which interfere with the task of boiling. But in the ordinary way, out of 1000 gallons of brine some 20 to 22 cwt. of salt are yielded. The bulk of the salt produced has been used in the adjacent chemical-producing district on the Tyne. In that industry some thousands of tons of salt weekly are decomposed, and it was formerly dependent on Cheshire and other parts. The quantity of salt annually produced in the United Kingdom is about 2,200,000 tons, of which nearly one-half is exported. Almost all of this large supply is derived from the brine springs of Cheshire, made at Winsford and Northwich. The brine springs cause considerable subsidence of the surface; this is particularly noticeable in the vicinity of Northwich. The town itself suffers much in this way, and to a stranger the houses appear to be coming down—a vertical wall or a square doorway being a rare sight; but the houses are mostly built on frames, and raised regularly as they subside by dumb screws, and accidents occur only occasionally.

In the south of Europe salt is obtained from sea-water, which is first brought into the condition of brine by a partial evaporation through exposure to the sun and air. It is

then pumped into iron pans, and the salt obtained by boiling on somewhat the same principle as above described. In many of the salt-gardens of the Mediterranean, however, the whole process is conducted by aerial evaporation.

In addition to its uses as an indispensable article of diet and an invaluable medium for the preservation of food, much salt is consumed for agricultural purposes and given to cattle and sheep, and enormous amounts are consumed in chemical operations, particularly in the manufacture of soda. [See SODIUM.] Salt is also used in the glazing of pottery, in glass-making, and in some metallurgical operations.

SALT LAKE CITY, or **UTAH**, situated on the south-east shore of the Great Salt Lake, is the capital of the Mormon territory of Utah, in the United States, at a distance of 776 miles from San Francisco and of 1150 miles from St. Joe, on the river Missouri. The country from the Atlantic borders of the great American republic is one of great difficulty after the Mississippi has been crossed, consisting as it does of a region of prairie, mountain, and valley. It was, however, long used as the mail route to California, and is now traversed by the great Atlantic and Pacific Railway, on which Salt Lake City is a chief station. The Mormon capital lies at the base of the mountains, on a pleasant plain which gently inclines to the shore of the Great Salt Lake, and is watered by some bright mountain streams conducted through the streets in artificial channels. The tabernacle is the first object which attracts a visitor, though it is devoid of all architectural beauty. It has an elliptic form, and its enormous roof is supported by forty-six huge sandstone pillars; 15,000 persons can be seated in it, and its organ is the largest in America. Worship, lectures, debates, meetings, &c., take place in it. The temple, which is unfinished, lies a little east of the tabernacle, and is inclosed within the same high walls. The city is laid out with great regularity, the streets—which are 128 feet wide—crossing each other at right angles; and it is well supplied with bazaars, markets, and shops. Most of the houses are built of wood, and surrounded by carefully cultivated gardens, in which the apple, the pear, and other fruit-trees flourish, and several of our best-known English vegetables. There is a commodious theatre, supplied with scenery and mechanical appliances of a superior order. The principal trade of the city is derived from the supply of provisions and other articles to miners and new settlers in some of the neighbouring territories. Every inhabitant is compelled to work at some occupation or other, and to contribute by his labour towards the wealth and prosperity of the community. To this cause is due the remarkable fertility of the surrounding country, which, formerly a barren waste, is now a scene of brightness and beauty. The population of Salt Lake City in 1880 was 20,768.

SALT LAKE, GREAT, a singular and extensive basin of water in the north of the territory of Utah, United States of North America, about 75 miles long by 30 broad, with an average depth of 7 feet, and a maximum of 33. It lies surrounded by steep and rugged precipices, at an elevation above the sea-level of only 4200 feet. Nine islands occupy the centre of the lake; the largest attains an altitude of 3300 feet, and the others are nearly as lofty. The bright emerald-green waters are remarkable for their excessive saltiness, containing 22 per cent. of chloride of sodium, and being consequently inimical to all animal life. So far as is known the lake has no outlet, though supplied by fresh-water streams, the Wear River from the north, and the Jordan from the south, which pour into it the overflow of a smaller lake (Utah), situated at a higher level. The shores, which present an impressively desolate and weird aspect, glitter with incrustations of salt from the spray of the waves. The only fertile and blooming tract is that which surrounds the Salt Lake City, at the

south-east extremity. The lake is supposed to be the Lake Temponogos visited by the early Catholic missionaries. It was described by Baron La Hontan in 1689, from the reports of the Indians. In 1813 it was explored by Colonel Frenont, who conducted the first boat expedition ever attempted on its waters.

SALT, SIR TITUS, one of the founders of modern British manufacturing prosperity, was born at the Old Manor House, Morley, on the 20th September, 1803. His father, who was a woolstapler, moved with his family from Morley to Crofton, near Wakefield, and at Heath Grammar-school, near that town, his son received his education. The father afterwards settled at Bradford, where he continued to confine himself to the purchase and sale of wool. The more ambitious son, now a partner in the business, determined to attempt the manufacture of stuffs, and gave the first indication of his speciality in the utilizing of raw materials hitherto unappreciated. The wool called "Don-skoi," a coarse and tangled material from the banks of the river Don in the south-east of Russia, first attracted his notice; and his success in making a useful fabric of this unpromising article caused a large extension of his works, and laid the foundation of his still more important enterprise. It was in 1836 that he achieved his greatest success, in becoming, for practical purposes, the discoverer of the wool or hair now known in almost all parts of the civilized world as Alpaca. In that year a Liverpool broker, of whom he was buying wool, showed him some bales of shining hair from the alpaca of Peru which had been sent to him, and which nobody would look at. Young Mr. Salt bought one bale on speculation, took it home, and soon returned and bought the whole lot and as much more as Liverpool could supply. After much persistent effort he had hit upon a method not merely of utilizing the alpaca wool in the manufacture of stuff, but in producing an entirely new substance, which had in it all the elements of commercial value. It was in appearance something between silk and wool, was cheap, and wore well. The new stuff speedily became a vast article of commerce, and the inventor was rewarded by a great increase of his business, his firm becoming the centre of the wealth and activity of a prosperous district.

In 1851 Sir Titus Salt resolved to take his works and workpeople into the country. A strip of land was bought at Shipley, about 4 miles from Bradford, near the Midland Railway and the river Aire, and a building was erected on it which was then regarded as the largest and handsomest factory in the world. The whole range of buildings covered $9\frac{1}{2}$ acres, and the ventilation, the warming, and the sanitary precautions were as perfect as they could be made. The workpeople, some 4000 in number, were housed in good cottages, and the town of "Saltaire" thus created was supplied with park, cricket grounds, baths and washhouses, an hospital, almshouses, lecture halls, a club and institute, places of worship, and schools by its founder.

Sir Titus Salt was mayor of Bradford in 1848, and for two years, 1859 and 1860, represented it in Parliament, but resigned his seat previous to the session of 1861. He received on numerous occasions very gratifying marks of the high esteem in which he was held, both in his public and private capacity, by his own community at Saltaire and by the people of Bradford; and in 1869 the honour of a baronetcy was conferred on him. He died at his seat, Crow Nest, near Bradford, 29th December, 1876.

SALTAIRE, a town of England, in the county of York, situated 5 miles N.W. of Bradford and 212 miles from London by rail. It was built by Sir Titus Salt round his great alpaca factories between the Aire and Leeds Canal. It includes a church and parsonage, a chapel, schools, club, and institute.

SALTARELLO (Lat. *saltare*, to leap), a dance with a prancing or leaping step in it, performed by two dancers

of opposite sexes. It is very quick in time, and is always danced in such a manner that the dancers are turning on each other. As a musical form it is not unfrequent, the best specimens being the pair of *saltarelli* which form the last movement of Mendelssohn's Italian symphony.

SALT'ASH, a small town of England, in the county of Cornwall, situated on the banks of the Tamar, at the head of the Hamoaze, $3\frac{1}{2}$ miles N.W. of Plymouth. It is a picturesque old town, built on a steep slope, and both men and women are famous at the regattas along the coast for their skill with the oars. In the old castle Drake stowed his treasure in 1580. Close by is Brunel's great masterpiece, the Royal Albert Bridge, which is 2240 feet long, with nineteen openings. The roadway of the river spans hangs from two huge arched tubes, which meet upon a pier carried up from midchannel, its foundation being 80 feet below the surface. Each tube weighs 1100 tons, and has a span of 445 feet, and their surface area is 7 acres.

SALTATORIA (Lat. *salto*, to leap) is a section of insects belonging to the order ORTHOPTERA. The insects of this section, which includes the crickets, grasshoppers, and locusts, are remarkable for their spinous tibiae and the largeness of their thighs, which are well adapted for leaping. The body is generally slender, the head large, and the wings and wing-cases well developed. The insects are voracious vegetable feeders. The males of most of the species possess the power of producing loud chirping sounds. Three families are included in the section Saltatoria—Gryllidæ (crickets), Locustidæ (grasshoppers), and Acrididæ (grasshoppers and locusts).

SALT'COATS (or *Saltcoats*, as spelled in old records), a small town of Scotland, in the county of Ayr, is about three-quarters of a mile south from Adrossan, and there is a beautiful sweeping bay between them, with a fine beach, which is a favourite promenade for strangers in the sea-bathing season. The population of the town of Saltcoats in 1881 was 5096, a large proportion of whom are weavers, employed by the Glasgow and Paisley manufacturers. Coal is exported to Ireland; shipbuilding and ropemaking are fitfully carried on; and salt is made to a small extent. The chief buildings, some of which have good architectural features, are a town-house, two parish churches, two Free churches, two U.P. churches, a Congregationalist church, and a Roman Catholic church. The town has a railway station, and is $29\frac{1}{2}$ miles south-west of Glasgow.

SALT TIRE, that use of the ordinaries in heraldry which takes the form of a cross made by oblique lines, the St. Andrew's Cross of Scotland. See HERALDRY.

SALTPETRE AND SAL PRUNEL'LA, common names for different forms of potassium nitrate. See POTASSIUM.

SALTS OF SORREL, the commercial name for potassium binoxalate. See OXALIC ACID.

SALTS OF TARTAR, the commercial name for potassium carbonate. See POTASSIUM.

SALTS, SMELLING, consist of the monocarbonate of ammonia, scented with a mixture of volatile oils. The mixture exhales a pleasant pungent vapour of perfumed ammonia, useful in faintness. A mixture of this substance with carbolic acid is known, under the name of anti-catarrh, as a popular remedy for colds, influenza, and hay fever. All smelling salts become useless after a time from the ammonia escaping. This reduces the compound to the state of bicarbonate, which is not volatile. The addition of liquid ammonia restores the original compound.

SALT'WORT (*Salsola*) a genus of plants of the order CHENOPODIACEÆ. The species are chiefly found on the sea-shore in temperate parts of the world, and also in tropical regions where the soil is saline or there is salt water in the vicinity. Prickly Saltwort (*Salsola Kali*), so named from yielding barilla or kali (that is, alkali), is found on the coasts of the British Isles, Europe, and of

many parts of the world, and is one of the species burned for the purpose of yielding kelp and barilla. *Salsola sativa* is found on the southern coast of Spain, where some pains are taken to extend it by cultivation, for the purpose of yielding builla when burnt. *Salsola Soda* is found on the southern coast of Europe, and in the north of Africa. Bailla is also obtained from this species, but the imports have very greatly decreased since the soda has been manufactured from common salt.

SALUS, the Roman goddess of health and prosperity. This is a type of the essentially practical character of the genuine Roman religion. The artistic side of the mythology, the legends of Jupiter, Juno, &c., they borrowed intact from the Greeks. Goddesses like Salus, Pax, Fortuna, Concordia, &c., were all their own. The great temple of Salus was erected first in B.C. 307 on the Quininal. Her festival was held in common with the goddesses Pax and Concordia on the 30th April, and was always considered a public function.

SALUTES are compliments paid in the army and navy on various ceremonial occasions. The English claim the right of being saluted at sea first in all places as sovereign of the seas. This respect to the British flag commenced as early as the reign of King Alfred. The Dutch agreed to it in 1673, after they had been defeated in several actions, and it was formally assented to by France in 1704, although it had for a long time previously been exacted by England.

In the present day salutes are essentially a matter of etiquette, and they belong to the same order as regulations about the boots and trousers of officers, and the occasions on which cocked hats are or are not to be worn. Detailed rules on what are termed "ceremonies and distinctions" are no doubt necessary in all their branches, but occasionally they pass with dangerous ease to the ridiculous.

Thus it was thought worth while, in 1876, that an elaborate code of salutes should be arranged between foreign nations and our own admiralty, and subsequently official regulations were issued embracing this new code, which came into operation in July, 1877. From these regulations it would appear as if advantage had been taken of every conceivable occasion for some sort of firing, from the modest tribute of seven guns with which the visit of a consul to one of her majesty's ships is greeted, to the simultaneous roar of guns specially reserved for the anniversaries of the birth, accession, and the coronation of the reigning sovereign, or the reception of royalty on such occasions as naval reviews, &c. The pecuniary cost of the custom must now be something very considerable. Our cannon are almost daily growing in size, and a salute from them becomes in every way more formidable. The "popguns" of fifty years ago were much better fitted to play their part in these ceremonials. When a large gun comes to be fired, it is not only that so many pounds or hundreds of pounds of powder are wanted, we must add the wear and tear of a gun costing thousands of pounds, the strain on the ship, and various occasional items, before our estimate is complete.

The regulations and code of salutes are detailed in the annual *Navy List*.

SALVADOR, SAN, the smallest of the republics of CENTRAL AMERICA, is bounded by Honduras on the N. and N.E., Guatemala on the W., the Pacific Ocean on the S., and the Bay of Fonseca on the S.E. The area is 7225 square miles, and the population in 1882 was about 613,000. The coast line, including the magnificent Bay of Fonseca (which separates this country from Nicaragua), is about 200 miles in length. The river Paza forms the western boundary.

The coast region consists for the most part of a belt of rich alluvial land, varying in width from 10 to 20 miles, behind which lies a broad plateau with an average elevation

of 2000 feet, and relieved by numerous volcanic peaks. Between this plateau and the Cordilleras (the northern limit of the republic), which attain a height of from 6000 to 8000 feet, is a broad fertile valley watered by the river Lempa. About midway between the valley of the Lempa and the Bay of Fonseca is the basin of the Rio San Miguel, the other principal stream. There are numerous lakes. The climate is salubrious, and cooler than might be expected from the general position of the country.

The population is composed of whites (of Spanish origin), Indians, negroes, and mulattoes. The whites are about one-fifth of the whole. The Indians are of the Aztec race, and, although nominally Roman Catholics, retain many of their heathen rites. This state has relatively the largest population, most industry, and greatest commerce of all the Central American republics. The most important products are indigo, coffee, maize, cotton, sugar, balsam of Peru, hides, skins, &c. In the Cordilleras along the north frontier are some celebrated mines of silver and gold; there are also rich iron mines, and vast beds of brown coal exist along the valley of the Rio Lempa. Many of the mines have been worked by English companies. The finances of the state are very satisfactory. The receipts and expenditure each amount to about £800,000 per annum. There is a public debt of nearly £1,000,000. The exports are valued at about 6,000,000, and the imports at 2,600,000 dollars per annum. The exports are chiefly indigo, cotton, coffee, sugar, tobacco, hides, minerals, &c. The ports of the state are La Union, Libertad, and Acaguta, now connected by rail with Santa Anna, 38 miles distant, the first being by far the most important. Great Britain enjoys the greatest share of the commerce of this country, the majority of the imports consisting of British manufactures, and of these cotton goods form the bulk. In like manner the greatest part of the most valuable products of Salvador are exported to Great Britain, the remaining portion being taken to France, the United States, &c. Coffee, loaf sugar, tobacco, cigars, rice, and timber are sent to California. A great part of the tobacco exported from this republic finds its way to Costa Rica; and the commodities sent to Panama and other places in South America consist of cigars, rice, mats, straw hats, cotton shawls, hammocks, &c. This country was conquered by the Spaniards in 1523, but separated from Mexico after the latter was recognized as an independent state in 1824.

SALVADOR, SAN, the capital of the above republic, is situated about 2115 feet above the sea, and 3 miles to the east of the volcano of San Salvador. It was founded in 1528, and has 13,274 inhabitants. The city was repeatedly destroyed by earthquakes and volcanic eruptions, the last time on 16th April, 1854, when it was overwhelmed by almost total ruin, in consequence of which most of the inhabitants erected new dwellings on a neighbouring site, at present called Nueva San Salvador. The new capital again was partly destroyed in 1873 by a series of earthquakes and eruptions, and suffered also severely in 1879. It is connected by a good road with the port of La Libertad, 15 miles distant, the principal harbour of the republic.

SALVADOR, SAN. See BAHAMAS; BAHA.

SALVADORACEÆ is an order of plants nearly allied to the Olive family (OLIVACEÆ), and, in fact, properly only a tribe of that order. The calyx has three or four divisions; there are four lobes to the corolla, and four stamens. The disc is wanting, but sometimes it is represented by glandular scales alternate with the stamens; the ovary is superior, with one or two cells, and one or two ovules in each cell, anatropous, erect from the base, the style is simple; the fruit is a fleshy berry, with an erect seed. The species are shrubs or trees; the leaves are opposite, with rudimentary stipules often present. There are eight or nine species, natives of tropical and sub-tropical Asia and Africa. The species of *Salvadora* are

few in number, and are found only in warm and dry parts of the world, as in India, Persia, Arabia, and on the coasts of the Mediterranean, whence they extend along the north of Africa, from the Nile to Senegambia. *Salvadora persica* has been supposed by some botanists to be the "mustard tree" of Scripture, but Caruthers has shown that this idea is not well founded.

SALVAGE, is the compensation made to those by whose skill and exertions ships or their cargoes are saved from extraordinary danger. The principle by which this allowance is made has been recognized from very early periods, and provisions for its regulation are to be found in the oldest maritime codes now extant. *Civil salvage* signifies the saving of a vessel or her cargo, or a portion of the latter, from the ordinary perils attending maritime adventure, the recovery from capture by a pirate or enemy being termed *hostile salvage*. As to the amount of salvage which shall be decreed, or the proportion in which it shall be given to salvors, there is no fixed rule or practice in maritime law. Each case must be considered upon its merits, and the award of the courts depends upon the danger to property, value, risk of life, skill, labour, and the duration of the service. It is a cardinal rule of law, that salvage services can only be performed by persons not bound by their legal duty to render them. A crew cannot, save under very exceptional circumstances, claim as salvors of their own ship or cargo, not only because it is their duty to save them if possible, but because it would be most unwise to tempt them to let the ship and cargo get into a position of extreme danger, that then, by extreme exertions, they might claim salvage. For ordinary services rendered to a ship in time of distress, no salvage is due to a passenger; but in his case, as in that of a seaman, extraordinary services may give a salvage claim.

SALVI. See SASSOFRERATO.

SALVINIA. See RHIZOCARPET.

SALZBURG (the ancient *Juratic*), the capital of the province of the same name, is situated in one of the most beautiful spots in Austria, on the Salza, over which there is a bridge 370 feet long and 40 wide. The city is surrounded by an amphitheatre of lofty Alps. The river runs between two isolated mountains, the Mondsberg on the left and the Capuzneberg on the right, leaving in many places only a narrow space, on which the city is built. The streets are narrow and crooked, and the squares small but regular; but on the right bank, near the railway station, a new and handsome quarter has sprung up since the demolition of the fortifications. The houses are flat-roofed and built of red marble. One of the former gates is a passage cut through the Mondsberg, 300 feet long, 30 high, and 24 broad. Salzburg gives title to an archbishop, who is called the Primate of Germany. The university, founded in 1620, was abolished in 1800, and a lyceum or academy established in its stead, which has a library of 30,000 volumes, a botanical garden, and a geological museum. The monastery of St. Peter has a library of 40,000 volumes. The city has a theatre, four hospitals, a lunatic asylum, and other public institutions. The cathedral, built in the seventeenth century, in the Roman style, with a facade of white marble, is adorned with paintings and numerous marble statues. St. Peter's Church contains the tomb of St. Rupert, who was buried here in 623; there are in all twenty-six churches. The archbishop's old palace, called Die Residenz, is a very extensive building ornamented with columns. The square in front of it is adorned with a handsome fountain 45 feet high, made entirely of white marble. On the opposite side of the square is a magnificent palace called the Neubau. The stables, for 130 horses, are very fine; near to them is a riding school, with three galleries for spectators, hewn out of the solid rock. In the Michaelsplatz there is a bronze statue of Mozart, who was a native of Salzburg. The house in which he

was born and that in which he lived still exist. The fortress of Hohensalzburg, commanding the town, is now used as a prison and barrack. There are also one military and three civil hospitals, a hospital for incurable patients, several schools, and many other useful and charitable institutions. The inhabitants, 25,000 in number, manufacture calicoes, leather, and hardware, and carry on an important transit trade. Salzburg is said to occupy the site of the Roman Juvavia, destroyed by Attila in 418.

SALZKAMMERGUT is the name of a district of Upper Austria, comprising the south-west part of the circle of Traun, on the borders of Styria. Its area is 250 square miles. The surface is almost wholly mountainous, and the scenery extremely picturesque; but the soil is unprofitable. Valuable salt mines are wrought here, however, on account of the government, the annual production being about 55,000 tons. The chief seats of the salt-works are Ischl, Hallstadt, and Berchtesgaden.

SAMARA, a town of Russia, the capital of a government of the same name, is situated on a height at the confluence of the river Samara with the Volga, 110 miles south-east of Simbirsk. It was founded in 1591, and now contains over 65,000 inhabitants. It has a cathedral, some iron works, and a considerable trade in corn, cattle and sheep, salt fish, caviare, skins, leather, and tallow. It is the chief grain market on the Volga, and it contains numerous store-houses for that article.

SAMARCAND, a town in Independent Turkestan, now belonging to Russia, is situated not far from the banks of the river Zerafshan, in the centre of a fertile valley. The country in the vicinity of Samarcand is traversed by a great number of canals, which are used for irrigation. It is mentioned in the history of Alexander the Great under the name of Maracanda, and in the times of the caliphs it acquired some fame as a seat of learning; but it attained its greatest glory in the fourteenth century, as the usual residence of the conqueror Timour, and consequently the capital of one of the largest empires ever known. Ulugh-Begh, the successor of Timour, being of a different disposition, raised the fame of the city as a seat of learning and science, especially in astronomy. But the family of Timour was driven from the throne and country by an irruption of the Uzbecks towards the end of the fifteenth century, and as their chief removed the royal residence to the town of Bokhara, Samarcand began to decline. The population was estimated in 1880 at 30,000; it has several bazaars and khans, and is a centre of the caravan trade, but is generally in a state of decay, though there are some buildings which attest its former splendour. Three of the colleges are nearly perfect, and one of these, which formed the observatory of Ulugh-Begh, is very handsome. The tomb of Timour remains, and is under a lofty dome, the walls of which are beautifully ornamented with agate. In 1863 the city was visited by M. Vambéry, in the disguise of a dervish. He was the first European who had entered it since the time of Marco Polo. The town was taken by the Russians, under Kaufmann, in 1868, and has since been increasing in prosperity.

SAMARIA (Heb. *Shomeron*, watch mountain), the name of the capital of the northern kingdom of Israel. The name of the city appears to have been derived from its situation, crowning as it did an oblong isolated hill, which rose by terraces to a height of some 600 feet above the surrounding plains, though an ancient tradition (preserved 1 Kings xvi. 23, 24) gives a different etymology. The city was founded by Omri about 925 B.C., and it continued the capital of the kingdom of Israel until 721 B.C. It had previously successfully withstood two sieges on the part of the Syrians in 901 and 892, but in 721 it was taken after a siege of three years by Shalmaneser, king of Assyria, its capture marking the downfall of the northern kingdom. The district of which it was the centre was afterwards re-

peopled by Esarhaddon, but nothing is known of the condition of Samaria up to the time of Alexander the Great, who took the city and depopulated it, replacing its inhabitants by a colony of Syro-Macedonians. It was again taken in 109 by John Hyrcanus, who completely destroyed it. Having been partially rebuilt and occupied by the Jews, it was restored by Pompey to the descendants of the banished Samaritans. By the direction of Galbinus it was further restored and fortified, and later, Herod the Great, who had received it from Augustus, rebuilt it on a magnificent scale, settled it with a colony of veterans, strengthened its fortifications, and named it Sebastê (Sebastos being the Greek equivalent of Augustus), in honour of the Roman emperor. In the third century A.D. it became a Roman colony and the seat of a Christian bishopric, but as its neighbour Nablous (the ancient *Shechem*) grew and prospered it sank into decay, and after the Mohammedan conquest of Palestine its glory finally departed. The Crusaders restored the bishopric of Samaria, and the office was sustained until the fourteenth century, but at the present day all that is left of the city is a heap of ruins and a small Arab village called Sebastieh, on the south-eastern slope of the hill.

Dr. Thompson speaks with enthusiasm of the beauty of the site of this city. He says:—"The view from the topmost terrace over the rich plains and hills around, far away to the blue Mediterranean, is magnificent. The remains of the city consist mainly of colonnades which certainly date back to the time of the Herods, and perhaps many of the columns are much older. There is a group of sixteen standing in a recess low down on the north-east side of the hill, and a similar group of sixteen on the top, though these last are larger, and there are many lying prostrate. The grand colonnade, however, runs along the south side of the hill down a broad terrace which descends rapidly towards the present village. The number of columns, whole or broken, along this line is nearly 100, and many others lie scattered about on lower terraces. They are of various sizes, and quite irregularly arranged, but when perfect it must have been a splendid colonnade."

SAMARITAN PENTATEUCH, the version of the Pentateuch in use among the Samaritans. It was referred to by Origen, Jerome, Eusebius, and some others among the fathers; but its existence as a separate codex was unknown to Western scholars until the early part of the seventeenth century, when Pietro della Valle obtained a complete copy, written in the ancient Hebrew or Samaritan character, from the Samaritans of Damascus. This was first described to Europeans by Morinus in 1628, and shortly afterwards it was published in the Paris polyglot. Morinus asserted that the Samaritan Pentateuch was superior both in authority and antiquity to the Masoretic text; but Gesenius, 200 years later, proved, by a systematic arrangement of the variations, that the Samaritan compilers had corrupted the Hebrew text, and that many of the alterations were of the most clumsy and palpable description. The version, however, is not without its value in the critical study of the sacred text, inasmuch as it agrees with the Septuagint in a number of places where the latter differs from the Hebrew text. The age and origin of this version have never been satisfactorily proved, and the greatest divergence of opinion exists among scholars upon both points. (See Davidson in Kitto's "Cyclopædia of Biblical Literature," third edition, 1876).

SAMARITANS. The name of Samaritan, in its strict use, would imply an inhabitant of the city of Samaria, but in the Old Testament the term Samaria is used first to include the whole territory over which Jeroboam made himself king, and at a later period to the whole of the central part of Palestine lying between Galilee and Judah. After the conquest of Samaria by Shalmaneser, king of Assyria, we read that he carried away the people into Assyria, and

replaced them by men from Babylon, Cuthah, Ava, Hamath, and Sepharvaim. It is not clear as to whether the original inhabitants were entirely deported, and commentators differ in their opinions upon this point, but the references in 2 Chron. xxx. and xxxiv. to the "remnant of Israel" would seem to imply that some of the old population were left in the land. The new colonies, however, represented a mixed race, and as they brought their gods with them, they worshipped at first a strange medley of divinities. Being troubled by the wild beasts which had multiplied during the periods of war and neglect, it occurred to them that the local deity was angry with them, and they petitioned the King of Assyria for one of the priests of the land who should instruct them in the worship of the deity of the district. Their request was granted, and they added the worship of Jehovah to that of their own national or tribal deities (2 Kings xvii. 41). In course of time the worship of Jehovah gained the ascendancy, and when the people of Judah began to return from the captivity, the Samaritans asked permission to participate in the restoration of the temple, and when they were refused feelings of hostility were kindled which were never afterwards appeased. The Samaritans are spoken of in the Book of Ezra as weakening the hands of the people of Judah, and troubling them throughout all the reigns of Cyrus, Darius, Ahasuerus, and Artaxerxes (Ezra iv.), and the hostility between the two peoples was increased in the latter part of the fifth century B.C., when the Samaritans built on Mount Gerizim a temple as a rival to that of Jerusalem. After this event the Jews and Samaritans regarded each other with perfect hatred, and several allusions to this condition of affairs are to be found in the New Testament. On the one side, the Samaritans claimed to be descended from the same ancestry as the Jews (John iv. 12), that Gerizim was a place of greater sanctity than Jerusalem, and that their copy of the law (*i.e.* the five books of Moses) was older and of greater authority than that used by the Jews; while on the other hand, the latter refused to regard the Samaritans as in any way shapers in the covenant with Israel, denied altogether the sanctity of Gerizim, and declared that the Samaritan copy of the law was the doubtful and untrustworthy bequest of an apostate. In the year A.D. 10, a party of Samaritans entered by stealth the Temple at Jerusalem at midnight, during the feast of the Passover, and strewed the sacred courts with human bones to pollute them. For this they were excluded from the strangers' courts of the Temple, publicly cursed in the synagogues, and their evidence was rejected in all Jewish courts of justice. In their turn the Samaritans retaliated, and occasionally, when the Jews were communicating by means of beacon fires the rising of the Paschal moon to their countrymen in Babylon, the Samaritans interfered, confusing the watchers by kindling flames at wrong seasons upon their own mountains. By the fanatical of the Jews the Samaritans were termed Cutheans, and classed with the heathen, their food was pronounced as impure as swine's flesh, and they were denied any share in the coming kingdom of the Messiah. It was in the face of prejudices of this character that Jesus talked with the woman of Samaria, and abode with the people of her village, and also uttered in the hearing of the Jews his parable of the good Samaritan. One result of this hostility seems to have been the hardening and confirming of the Samaritans in their beliefs, which they have retained until the present day, though they are now reduced in Palestine to an insignificant colony of a few hundred persons. A few remnants of the colony which was transplanted by Alexander the Great to Egypt are also to be found at Cairo.

SAMBUKA, the Greek name for the Hebrew *Sebek*, a large harp with many strings.

Sambuca was also the name given by the Romans to a military engine used to provide means for scaling besieged

cities, the name arising from its roughly resembling a harp in shape.

SAMBUR DEER (*Rusa aristotelis*) is a species of DEER (Cervidæ) found in the hill-country throughout India. The male is nearly 5 feet high, with a stout body, covered with deep brown hair, which is long on the neck. The antlers are massive and over 3 feet long; they present only three tynes, the brow being simple, and the beam forking high up. The female is smaller and of a yellowish tint. The sambur is almost nocturnal in its habits, passing the day in almost inaccessible retreats. It is also known as the Gerow. Several nearly allied species inhabit the Malay Peninsula and some of the adjacent islands.

SÁMIEL, the Turkish name of a wind which in Arabia is known as the *Samoom* or *Simoom*, in Egypt as the *Khamzin*, and in Senegambia and Guinea as *Harmattan*. It occurs in most countries which are placed at no great distance from sandy deserts, and it blows always from that quarter in which the desert is situated. It is extremely hot, and a considerable quantity of fine sand is generally suspended in the air, which has been collected by the winds in rushing over the waste. It affects the human body very powerfully, producing great feebleness, and sometimes even death.

SAMNITES, an ancient nation or confederacy of nations, in Central Italy, who made a brave struggle against Rome. They occupied an extensive tract of country on both sides of the central ridge of the Apennines, including the valleys of the Volturnus, Tamarus, and Cilar, towards the Tyrrhenian Sea, and those of the Sarus, Tifernus, Trinius, and Lento, towards the Adriatic, and corresponding to the present provinces of Sammo and Principato Ultra and parts of Terra di Lavoro, and of Abruzzo Citra, in Southern Italy. The territory of the Samnites was bounded on the N. by the Peligni and Marrucini, and by the Adriatic; on the E. by Apulia and Lucania; on the S. by the Campanians, and on the W. by Latium and the country of the Marsi. The Samnites were originally a colony of the Sabines, which migrated to the banks of the Volturnus and the Tamarus, and thence spread on one side as far as the plains of Apulia, and on the other to those of Campania. They were an agricultural and pastoral people, and as their numbers increased beyond the means of subsistence, they followed the custom of their Sabine ancestors, and sent forth colonies, which were the origin of the Lucanians, who gradually extended as far as the southern extremity of the peninsula. The Samnites were divided into several nations or tribes, known by the names of Pentri, Caudini, Caraceni, Hirpini, and Frentani. Among the principal towns were—Boianum, now Boiano, near the sources of the Tifernus; Isernia, now Isernia; Alifia, now Alfi; Maluentum, afterwards called Beneventum, now Benevento.

About B.C. 340 the first war began between the Romans and the Samnites. The history of the long struggle which then commenced is an important part of the history of the Roman subjugation of Italy. It was not until B.C. 290, after half a century of almost uninterrupted war, that the Samnites, worn out by their repeated defeats, sued for peace, which the Romans, likewise exhausted by their dearly-bought victories, felt disposed to grant. The result of this succession of wars, was that the Romans extended their power over South Italy, Campania, and Apulia, and thus became neighbours, and soon after enemies, of the Tarantines. The Tarentine War induced the expedition of Pyrrhus into Italy, and led to the first war of the Romans with an enemy from beyond the Italian frontier. In the war of Pyrrhus, the Samnites joined that prince, after whose second retreat from Italy and subsequent death, they found themselves attacked by two Roman armies and utterly defeated (272 B.C.) After this Samnium ceased to exist as an independent state.

SAMO'AN ISLANDS. See NAVIGATOR ISLANDS.

SA'MOS, an island in the Grecian Archipelago, belonging to the Turks, and called by them *Susam Adasi*, is situated on the west coast of Asia Minor, at the distance of about a mile from the promontory of Trogilion or Capu Santa Maria, which lies between the Gulf of Segla Nova and that of Balat.

In the time of Cyrus, the first king of Persia, Polukratès was the tyrant, as the Greeks called him, or ruler of Samos, but he was put to death by the Persians. The island recovered its independence after the defeat of the Persians at Mycale, B.C. 479. The history of Samos from this time belongs to the general history of the Greek states of Western Asia. It finally became subject to Rome, B.C. 81.

The inhabitants were distinguished for their commercial activity and their love of the arts. It was the native country of the sculptor Theodôros and of Pythagoras. Rhoikos, a Samian, built the Héraion, or temple of Héra, at Samos, the largest which Herodotos had seen. Its dimensions were, in length, 346 feet; in breadth, 189 feet. The material was the white and bluish-gray marble of the island. No vestiges of it are now extant. The coins of Samos are numerous. The earliest have the head of a lion or of a bull; a winged wild boar or the prow of a ship are common reverses.

The form of the island of Samos is irregular; the greatest length is from west to east, and the circumference is about 80 miles. It is separated from the continent of Asia by a narrow strait about 6 miles in length, and nowhere more than 3 in breadth, full of small islands. In this strait the fleet and army of Xerxes were defeated on the same day that his troops in Greece, under Mardonios, were dispersed and destroyed at Platæa (B.C. 479).

Samos is traversed by two ranges of rocky limestone mountains, whose slopes are partly covered with pine woods, vineyards, and olive groves. The valleys are fertile, and this is one of the most productive islands of the Archipelago, exporting corn, oil, valonia, raisins, and very good muscadine wines. The mineral products include marble, iron, lead, silver, and emery.

Opposite to the old city of Samos, and about a mile to the west of it, lies the modern town of Cora, the largest in the island. One of the best harbours is Vathi, which is capable of holding a large fleet. Samos was formerly celebrated for its pottery, which was made from a particular kind of clay found in the island.

The inhabitants, about 50,000 in number, living in villages, are nearly all Greeks; they are described as being wretched in their condition and habits, and of a savage appearance.

SAMOY'ED LANGUAGES form a distinct branch of the vast and little known Turanian or Scythian family, of which the Finnish and Hungarian tongues, forming the first or European branch, are the only ones at all familiar to us. The second branch is made up of the Tartar languages of Central Asia, and the third is that in question. All three branches are markedly agglutinate, and have little or no inflexions. The Samoyed languages are entirely devoid of literature, so far as our knowledge of them extends, and although covering so large a space are regarded as of no importance philologically. Just so much is well established with regard to them, that they are closer to the Hungarian than to the Tartar tongues.

SAMOY'EDS, a widely-spread nomadic nation of Northern Asia, forming one of the four families of the great Altaian stock. They inhabit two large tracts, one of which extends along the shores of the Polar Sea, and the other on both sides of the Altai Mountains.

The Northern Samoyeds traverse the country which occupies the western portion of the coast of Siberia, between 45° and 100° E. lon., and 70° and 80° N. lat. They are of short stature, seldom attaining 5 feet. They have

round, broad, and flat faces, thick lips, a broad and open nose, very little beard, and very coarse black hair. They are stout, and have muscular limbs. Though possessing herds of reindeer, they use them only for drawing their sledges. They live chiefly by hunting and fishing. They are heathens. It is stated that the numerous tribes which belong to the Northern Samoyeds amount to 70,000.

The Samoyeds, whose name implies "eaters of one another," though there is no trace whatever of their having deserved to be branded as cannibals, originally migrated from Siberia; but they are not the primitive inhabitants of the soil; for the ruins of whole lines of ancient dwellings are found on the banks of lakes and rivers.

The Northern Samoyeds are divided from the Southern by an immense tract of country occupied by the Ostiaks and several tribes of Tunguses.

The Southern Samoyeds inhabit that part of the Altai Mountains which lies between 80° and 105° E. lon., and 50° N. lat. Some of this country is included within the territories of the Chinese Empire; and these Samoyeds, called Soyotes, are tributary to the Emperor of China, and obliged to do military service along the frontier. The rest of the Samoyeds are in the Siberian territory. Some of the tribes live wholly by the chase, while others have herds of reindeer, their country being the most southern region in which that animal is met with in Asia. A few have adopted agriculture, but they eat also the roots and stems of some wild-growing plants. The Soyotes, however, inhabit a rich pasture country, and live on the produce of their herds, consisting of horses, black cattle, and camels. These Southern Samoyeds exactly resemble their northern kinsmen in the formation of their bodies, except that they have a tolerably thick beard. The different tribes speak several dialects of the same language, which varies greatly from those spoken by all the neighbouring nations, though it contains a considerable number of roots which occur in the languages of some nations of Central Asia.

SAMPHIRE, an herb in much request in some parts of the country as a salad and pickle. The true samphire is the *Crithmum maritimum*, a plant belonging to the order UMBELLIFERÆ. It grows on rocks by the seaside, in the British Isles, and southward to Northern Africa. The stem is about 18 inches high; the flowers are yellow. The leaves and young shoots form an excellent pickle, and it is sometimes successfully cultivated. It was thought highly of in former times. Shakspeare alludes to the danger incurred by those gathering it in its native haunts:—

"How fearful

And dizzy 'tis to cast one's eyes so low!
The crows and choughs that wing the midway air,
Show scarce so gross as beetles: half-way down
Hangs one that gathers samphire, dreadful trade!
Methinks he seems no bigger than his head."

Gerard, who wrote his "Herbal" about this time, says that "Sampier is thought the pleasantest sauce, most familiar and best agreeing with man's bodie, both for digestion of meates, breaking of the stone, and voiding of gravel." He adds that it "groweth on the rocky cliffs of Douer, Winchelsey, by Rie, about Southampton, the Yle of Wight, and most rockes about the west and south-west parts of England." It is a pity that this plant is not more used at the present day, as it is a very agreeable pickle. Unfortunately GLASSWORT (*Salicornia herbacea*) is generally substituted for it. The golden samphire is a perennial plant, *Jula crithmoides*.

SAMUEL (Heb. *Shemuel*, "name of God," "placed by God," or 1 Sam. i. 20, "heard of God"), the last Shofet or Judge of Israel, and one of the first of the prophets, was the son of Elkanah and Hannah, and was, in accordance with his mother's vow, brought up at Shiloh as an attendant upon the priest Eli. His father is described 1 Sam. i. 1, as an Ephraimite, and by the chronicler he is described

as a Levite, 1 Chron. vi. 22, 23; but the genealogy given of the prophet and the situation of his birthplace are among the unsettled problems of Hebrew history. The first public event recorded in the life of Samuel is his leading the people against the Philistines at Mizpeh, when the Israelites obtained a decisive victory, and Samuel appears in consequence to have been raised to the rank of Judge. His own residence was at Ramah, where he married and had sons born to him, but in the course of his public services he seems to have regularly visited the three sacred places, Bethel, Gilgal, and Mizpeh, and encouraged the formation of the bands of prophets which appear about this period for the first time in Israelitish history. His great work, however, was in connection with the national worship of the people, which he strove to connect exclusively with Jehovah, and in the appointment of a king under whom the disunited and disorganized tribes were united into a nation. In both respects his influence was of the most important character, affecting most materially the subsequent history of the people. By the sacred historian he is praised for his uprightness, justice, and faithfulness to Jehovah, and though he was not devoid of the sternness peculiar to his period he represents unquestionably one of the noblest characters of Hebrew history. By the Jews of a later period he was honoured as second only to Moses.

SAMUEL, BOOKS OF, two historical books in the Septuagint, Vulgate, and Authorized Version of the Old Testament, which with the two subsequent books of Kings form in the Hebrew scriptures one continuous work. From a critical point of view the two books constitute one work, and they are of an unmistakably different date and authorship to the succeeding books of Kings. Like nearly all the historical books of the Old Testament, there is nothing in the books themselves to indicate the name of the author, and it is somewhat remarkable that the first Jewish statement as to the authorship of these books dates only from 500 A.D., when it was asserted most absurdly in the Babylonian Gemara, that "Samuel wrote his book," i.e. the book which bears his name. This assertion is disproved by internal evidence, but in its place only conjecture remains. Similar difficulties exist in reference to the date of the composition of the work, and beyond the fact that its language and references point to a period earlier than that of the reformation of Josiah but little can be said. It is written in pure Hebrew, and it is one of the finest specimens of Hebrew prose, but this circumstance will not of itself indicate the period of its composition. It contains a history of Israel from the birth of Samuel, about B.C. 1150–1160, to close upon the death of David, about B.C. 1020, and there is some reason to believe that in its earliest form it was carried on to the end of the reign of David, and possibly to that of Solomon. It contains very few references either to the law or to Moses, and the manners and customs it records are very different from those enforced by the Levitical legislation after the exile. The work bears internal evidence of its being a compilation, both oral traditions and written documents being placed under contribution, and in some places two distinct and different versions are preserved of certain historical events. The poetical pieces preserved in the book appear to be derived from a lost Book of Jasher, and they seem, in some instances, to have been assigned to the characters of the book in a somewhat arbitrary manner. Thus in 2 Sam. xxii. we have a song of David, which is assigned to David at the time when he was delivered out of the hand of his enemies and the hand of Saul, but which contains allusions to the victories of a later period and closes with a reference to mercies shown unto the seed of David for evermore; and still more curiously a chant of victory apparently composed after a successful battle is placed in the mouth of Hannah as a thanksgiving for the birth of her son, 1 Sam. ii. 1–10. See Bleek's "Einleitung in d. Alte Testament" (Eng. trans.

London, 1869), Ewald's "Geschichte des Volkes Israel" and Dean Stanley's "Lectures on the Jewish Church."

SAMYDACEÆ, an order of plants placed by Bentham and Hooker in the cohort Passiflorales, of the POLYPTALÆ. It is entirely a tropical order, composed of small trees or shrubs. The bark and leaves are slightly astringent. One of the species, *Casearia ulmifolia*, is used in Brazil as a remedy against the bite of snakes, for which purpose the leaves are applied to the wound, and an infusion of them is taken internally. A decoction of the leaves of *Casearia lingua* is used internally in inflammatory disorders and malignant fevers. The bark of *Casearia astringens* is said by Martius to be useful as a poultice or lotion for badly healed ulcers. The chief characteristics of the order are the following:—The flowers are small, collected several together; the calyx has three to seven lobes; the petals are wanting or are similar to the sepals, and of the same number; there is no corona as in the allied family of passion-flowers; the stamens are sometimes definite in number, often alternate with glands or staminodes, sometimes numerous, and occasionally collected in bundles opposite the petals; the ovary is superior, one-celled, sometimes adnate to the calyx-tube; the style has one or three stigmas; the ovules are anatropous, and adfixed to the three to five parietal placentas; the fruit is a three to five-valved capsule; the seeds have an axile embryo in copious albumen; the leaves are alternate, undivided, often with pellucid dots or lines. There are 150 species, natives of the tropics.

SAN DOMIN'GO, a republic of the Island of Hayti, in the West Indies, established in 1811 and re-proclaimed with changes in 1865, 1879, 1880, and 1881. The area is estimated at 18,945 square miles, with a population in 1880 of 400,000. The republic is divided into the five provinces or states mutually independent, of San Domingo, Azua de Compostela, Santa Cruz del Seybo, Santiago de los Caballeros, and Concepcion de la Vega, besides four maritime districts. The population, like that of the neighbouring Hayti, is composed mainly of negroes and mulattoes, but the whites, or European-descended inhabitants, are comparatively numerous, and owing to their influence, the Spanish language is the prevailing dialect. The commerce is small, owing in part to customs duties of a prohibitory character, but is stated to be increasing. The principal articles of export are lignum vitæ, logwood, mangle, coffee, fustic, tobacco, and cocoa. The export of mangle has decreased in recent years, but sugar is assuming more and more importance. Cocoa and sugar are cultivated. The revenue and expenditure are each about £300,000, and there is an acknowledged foreign debt of £123,000. At the end of 1881 a railway, 20 miles in length, had been constructed between Samana and Santiago, embracing the whole of the rich provinces of the north. The foreign commerce is shared by the ports of San Domingo, the capital, and Puerto Plata, with the recently opened ports of Samana, Azua, Monte Cristi, Barahona, and Moca. See HAYTI.

SAN FRANCISCO (sometimes called *Saint Francisco*), the commercial metropolis of California, is situated on the west shore of the magnificent bay from which it derives its name. It stands in a plain about half a mile wide, gently inclined towards the bay, with numerous hills behind it. The soil on which the city is built is very sandy, and in the vicinity, more particularly towards the north, are a number of sandhills. It is regularly laid out, the streets crossing each other at right angles. The houses were formerly mostly of wood, but since the destructive fires that have several times occurred, laying the greater part of the town in ruins, brick and iron are extensively used. It now contains many well-built fire-proof stores and banking-houses. The city was originally built around a semicircular bay, the two points of which

are about a mile apart. All the intervening space is now built on, the warehouses and wharves being supported on piles driven into the sand. Directly in front of the city, but at a distance of 6 miles from it, lies Goat Island, nearly 2 miles in length. It is barren and rocky, except on the east side, where there is some cultivation in the valleys. Near the city Telegraph Hill rises to an elevation of 1000 feet, and from its summit an extensive view may be obtained of the surrounding country.

The fashionable promenade is Montgomery Street, a wide and handsome thoroughfare. On Stockton and Dupont Streets, towards the southern part of the city, are many fine residences, built of brick; west of Stockton, and on the surrounding hills, are many handsome houses of wood, but being separated from the rest of the city they are comparatively secure in the case of fire. Most families have their residences in the outskirts or in the rear of the town. The principal streets are paved with heavy timber, and all the business thoroughfares have passenger railways through them. In the centre of the city is a large public square or *plaza*. Some of the hotels of San Francisco are among the largest in the world.

San Francisco has a custom-house, branch mint exchange, marine hospital, splendid musical fund hall, very fine masonic temple, and several theatres. The custom-house is a very extensive and substantial building, and the city hall, completed in 1880, is a magnificent structure nearly a quarter of a mile in length. There are numerous banking houses, and nearly 100 places of worship, including Baptists, Congregational, Episcopal, Methodist, Presbyterian, Roman Catholic, Swedenborgian, Unitarian, German Lutheran, Dutch Reformed, Swedish Lutheran, Hebrew synagogues, and several Buddhist temples. The city is a seat of a Roman Catholic archbishopric. Among the newspapers and journals are papers published in the French, German, Italian, and Spanish languages.

The benevolent institutions and societies are numerous, and are liberally supported. Among them are the marine, city, and county hospitals; Protestant and Catholic orphan asylums, and the State Institution for the deaf, dumb, and blind. To the credit of the city it may also be said, that no place in America of equal size can boast of being more liberally provided with first-class public and private schools. The city was visited with a severe earthquake in 1868, and in order to prevent loss of life on the occasion of any future shocks, the Roman Catholics have built an earthquake-proof church. This edifice—St. Patrick's Church—is built on a plan to prevent loss of life in the event of the shaking down of the walls. The theory of the plan of construction is, that should the pillars be shaken down the roof would be launched off outside the walls, instead of falling inside, thus giving a chance of escape from the ruins. San Francisco is supplied with water from Mountain Lake, situated about 3½ miles to the west. There are several handsome cemeteries in the vicinity of the city.

With the exception of that of San Diego, San Francisco possesses the only large and secure harbour on the coast between Victoria and Guaymas, a distance of 2000 miles. In consequence of this advantage and its ready communication with the interior, it enjoys a monopoly of the commerce of the American states on the Pacific, and it has a future of almost incalculable possibilities before it, on account of its position, climate, and natural wealth. The Southern Pacific Railway comes into the city, but the terminus of the Central Pacific line is at Oakland, on the other side of the bay, to which enormous ferry boats convey goods and passengers.

The exports of treasure from San Francisco averages about £11,000,000 per annum. The exports, exclusive of treasure, in 1885, were valued at £7,500,000, the chief articles being wheat, flour, wool, and quicksilver. The city is connected by railway with New York, and con-

sequently with all places of importance in America, and extensive exports are sent eastward by rail. The number of inhabitants in 1880 was 238,956, including a large number of Chinese, who dwell in a separate quarter, and have their own schools, religious houses, and places of amusement, although a large number of them have acquired the English language. Many of them are engaged in occupations which are elsewhere performed by women, washing and ironing being one of the most common. Their numbers, owing to legal interference, is now decreasing.

History.—The first settlement at San Francisco was made by the Spaniards about the year 1778. The first scattered houses were built of adobes, or sun-dried bricks. In 1839 it was laid out as a town. It contained in 1845 about 150 inhabitants, when it began to attract the attention of some adventurous Americans, and the population increased in two years to nearly 500. It retained the name of Yerba Buena until it was occupied by the Americans. The first discovery of gold was made at Sutter's settlement, then called New Helvetia, in December, 1847. Early in 1848 the news spread to the four quarters of the globe, and immediately adventurers from every land came thronging to this new Dorado. Owing to its magnificent harbour it became the great rendezvous for the arriving vessels, and from this period commenced the extraordinary increase and prosperity of the Californian metropolis. In the first two months of the golden age the quantity of precious dust brought to San Francisco was estimated at 250,000 dollars, and in the next two months at 600,000 dollars. In February, 1849, the population of the town was about 2000; in August it was estimated at 5000, and in the following April at 67,000—over 60,000 immigrants having arrived in the interval. In 1850 San Francisco became a city.

SAN FRANCISCO BAY, the fine land-locked harbour on which the above city stands, is about 55 miles long, N.N.W. to S.S.E., and 2 to 12 miles broad. Its north portion is called the Bay of San Pablo, which communicates by the Strait of Carquinez with Suisan Bay, formed by the united Sacramento and San Joaquin rivers. The entrance to the Bay of San Francisco is by the passage called the Golden Gate, a mile wide.

SAN GREAL or **SAN GRAAL**. See GRAAL.

SAN JOSE, the capital town of Costa Rica, Central America, situated nearly midway between the Pacific and Atlantic, about 4500 feet above the sea, united by road and railway to Punta Arenas, on the Gulf of Nicoya. It succeeded to Cartago, 12 miles east, as the capital of the state, after the earthquake of 1841. Coffee is largely grown in the surrounding district, and the town is the seat of a university.

SAN JUAN, a river of Central America, Nicaragua state, by which Lake Nicaragua discharges into the Caribbean Sea. It brings down sufficient water from the lake, even in the dry months of March to June, to keep open a fine harbour at its mouth; but a large proportion of the water is now carried off by the delta branch, called the Colorado, in Costa Rica territory, so that the harbour of Greytown has silted up. The whole course is about 100 miles.

SAN MARINO, REPUBLIC OF, a small territory, consisting chiefly of a steep mountain, 2635 feet in height, with its offsets and valleys, covering an area of about 30 square miles. It is situated about 10 miles from the coast of the Adriatic, and is inclosed on all sides by the kingdom of Italy. The whole population amounts to about 8000. The town of San Marino stands on the upper part of the mountain, the summit of which is crowned by an old castle with three towers, on which the standard of the republic waves. The place is ill-built and ill-paved; the streets are steep, and only practicable for mules and donkeys. The square before the town-house is large, and commands

a fine view of the neighbouring Apennines. The church of the Capuchins contains a fine painting representing the "Descent from the Cross." There are several other churches, two convents, the governor's palace, with schools and museum; the library of Cavaliere Borghese, a town-hall, theatre, two cisterns for the use of the public, and hospital. Outside of the town (which is surrounded by walls, and is accessible by only one road) is Il Borgo or the suburb, and at the foot of the mountain are three or four villages, Serravalle, Acquariva, Feglio, &c. The inhabitants have cultivated every slip of ground that can be made productive; they make very good wine and oil, and rear silkworms, the produce of which constitutes an article of trade. They have good cattle, but import corn from the neighbouring districts. Some of the population are employed in manufacturing silks. The climate is healthy, but severe in winter.

The origin of the republic of San Marino is lost in the obscurity of the dark ages. Marinus, a holy hermit from Dalmatia, is said to have retired to this mountain in the fourth century, and after his death a church was raised to his memory, and a village grew up around the spot. In the tenth century it became a walled town by the name of Plebs Santi Marini cum Castello. It seems to have governed itself as an independent municipality, and we find in the twelfth century that the commune of San Marino purchased some lands from the neighbouring counts of Montefeltro, lords of Urbino. During the wars of the Guelphs and Ghibelines the people of San Marino took the part of the latter, and were excommunicated by Innocent IV. The commune of San Marino being summoned, towards the end of the fourteenth century, to pay certain dues and fees to the papal government, refused; and the matter being referred to a learned judge of Rimini, called Palamede, he decided that the community and men of San Marino were exempt from payment, having been of old independent of all foreign dominion, a decision which was confirmed by the vicar Theodoric. From that time San Marino was acknowledged as an independent state by the popes, although some of them, or rather their legates in the Romagna, attempted at times to enforce their authority over the little republic.

When Bonaparte overthrew the papal government he respected the independence of San Marino; and in 1814, when the Pope was reinstated in his dominions, its freedom was confirmed. The legislature of the miniature republic is a senate of sixty members, elected for life equally from the ranks of nobles, citizens, and peasants. Two *capitani reggenti*, or presidents, are chosen every six months. Two legal functionaries and two secretaries of state are the other public officers. The revenue of the state is a little over £1000 annually; and the total military force consists of forty men, forming the guard of the regency. In 1872 it concluded a treaty of protective friendship with the kingdom of Italy. The inhabitants are remarkable for their hospitality, sobriety, industry, and general morality. They are sensitively jealous of their rights, and cling with tenacity to their territorial and legislative independence.

SAN SALVADOR. See BAHAMAS; SALVADOR.

SAN SEBASTIAN. See SEBASTIAN, SAN.

SAN STEFANO, a small village on the Sea of Marmora, south-west of Constantinople, which is historically famous for the treaty signed there on 3rd March, 1878, between Russia and Turkey. The treaty established the independence of Montenegro, Servia, and Roumania; constituted Bulgaria—with very extensive boundaries—a tributary principality of Turkey; required a heavy indemnity for Russia, who was also to gain a port on the Black Sea and Kars; the exchange of the Dobruddschia for Bessarabia; various rights for Christians; and the opening of the Bosphorus and Dardanelles in peace and war. The treaty was much modified by the Treaty of Berlin, signed on 13th July following. See BERTIN TREATY.

SANA'A or **SA'NA**, the capital city of Yemen, ARABIA, is situated in a fine valley, 4000 feet above the sea, and 110 miles E.N.E. of Hodeida, on the Red Sea. It is inclosed by walls, $5\frac{1}{2}$ miles in circumference, and mounting some cannon, but in a very bad condition. The houses are built mostly of brick, with open holes for windows; but some belonging to the higher classes have stained glass windows. Most of the houses are furnished with fountains. The public buildings include two stone palaces of the Imam, about twenty richly decorated mosques with gilded domes, some public baths, and a stone bridge across the main street, which is inundated during rains. The principal commerce is in coffee and its husk, which latter fetches the higher price here, and is exclusively used for consumption in the city. The imports comprise piece goods, Persian tobacco, dates, twist, and glass wares. The inhabitants number altogether about 40,000, including 3000 Jews, who inhabit a separate part of the city, and who, with the Hindus, monopolize most of the foreign trade, but they are obliged to conceal the property they possess for fear of exaction. Some remarkable ancient inscriptions have been found in this city.

SAN CROFT, WILLIAM, Archbishop of Canterbury, was born at Erisinfield in Suffolk, in 1616. He lost his fellowship at Emmanuel College, Cambridge, in consequence of his refusal to take the Solemn League and Covenant, but was appointed master of the college in 1662. In 1663 he was dean of York; in 1664, dean of St. Paul's; in 1668, archdeacon of Canterbury, and in 1678, archbishop of Canterbury.

When James II., intending to introduce popery, issued his declaration for liberty of conscience, Sancroft refused to publish it in the churches as directed, and, accompanied by six other bishops, presented a petition to the king against the declaration. He was committed to the Tower with his co-signatories, but they were all acquitted on their trial. When the Prince and Princess of Orange were declared king and queen, he refused to acknowledge them, and was in consequence deprived of his dignity (1st August, 1689). He died 24th November, 1693.

SANCTUARY, a consecrated place which gave protection to a criminal taking refuge there. The word also signifies the privilege of sanctuary, which was granted by the king for the protection of the life of an offender. Sanctuaries existed from the very earliest times among the Jews, and they were associated with most of the great temples of antiquity. In many instances they had existed from times so remote as to be associated with the mythical or real founders of the temples or cities to which they were attached; and they were long supported by public opinion, though they frequently became associated with grave abuses. In England, under the dominion of the Normans, two kinds of sanctuary existed, one general, which belonged to every church, and another peculiar, which originated in a grant by charter from the king. The general sanctuary afforded a refuge to all persons who had been guilty of capital felonies. On reaching the felon was bound to declare that he had committed felony, and came to save his life. A peculiar sanctuary might, if such privilege was granted by the charter, afford a place of refuge even for those who had committed high or petty treason; and one escaping thither might, if he chose, remain undisturbed for life. He still, however, had the option to take the oath of abjuration and quit the realm. Sanctuaries and the privilege of sanctuary were much diminished during the latter part of the reign of Henry VIII., and were abolished by 21 James I. c. 28. The precincts of the Abbey and Palace of Holyrood, near Edinburgh, are still a sanctuary for Scottish debtors.

SANCTUS, that part of the Mass which immediately precedes the consecration of the Host—always a point of especial importance, therefore, in the composition of the music of the Mass. The English words are "Holy, holy,

holy, Lord God of Sabaoth: the heavens and earth are full of thy glory; Hosanna in the highest."

SANCTUS BELL or **SA'CRING BELL**, a bell rung in the Roman Catholic churches immediately after the Sanctus and during the consecration of the host, so that persons outside the church may follow the service in its most important particular.

"Her voice was as clear as a sacring bell
That is rung at the Holy Mass."—*Old Ballad.*

Also when the Host is carried through the streets to the sick, the "sacring-bell" is rung before it, that passers by may regard it with reverence.

The Brahmanic priests in Hindustan have an exactly similar custom with regard to the *ghunta* or small hand-bell, which they ring at the chief moment of their service.

SAND is a loose aggregation of particles of mineral matter, owing its finely comminuted state to the action of water or air in motion, or to a combination of these two destructive forces. A few comparatively local beds consist exclusively of worn-down fragments of shells and corals, but almost all ordinary sands are composed of more or less rounded grains of quartz. In some cases, as in the glass-making sand of the Isle of Wight and Hampshire, the particles are scarcely stained with extraneous minerals, and so produce a nearly white mass; but in the majority of instances a thin film of the oxides of iron and manganese envelops each grain, and the variability in the tint of this coating gives rise to the different coloured sands observed. The staining material can usually be removed from the particles by dilute acid and the application of heat.

SAND DUNES or **LINKS** are irregular hillocks of blown sand, sometimes from 50 to 60 feet in height, occurring on most low coasts where a considerable expanse of sandy shore is exposed between the tides. In Great Britain the most extensive examples are found in Morayshire, in Norfolk, and along the coast of Lancashire; but rarely an estuary is free from wide barren tracts covered by these low mounds. The dunes are frequently of importance as temporary barriers to incursions of the sea, and their firmness is much increased by the network of winding roots of the Sand Marram (*Ammophila arundinacea*), nearly always present in abundance.

SAND, GEORGE, was the *nom de guerre* adopted by the famous authoress Amantine Lucile Aurore Dupin, Madame Dudevant. Aurore Dupin's mother was a waif of the Paris streets, first mistress, then wife of Aurore's father. By her father she was a descendant of the notorious Maréchal de Saxe, the famous illegitimate son of Augustus of Saxony by Aurore von Königsmark. The marshal was her father's mother's father. Aurore Dupin was born at Paris in 1804, strictly educated in a convent, married at eighteen to M. Dudevant, a man with whom she had not an idea nor a taste in common, and had already by the time she was twenty-five cut herself adrift from the hateful bond, careless of the stigma society (and very properly too) cast upon her. Sensible of great literary powers she went to Paris in 1831 to earn her bread, and wrote for the newspapers. Here she formed the first of many irregular companionships of the like kind, with M. Jules Sandeau the novelist; and the pair published a capital ordinary novel under the pseudonym *Jules Sand*. Wishing to retain such fame as she thus acquired, yet honestly desirous of marking a difference, Madame Dudevant took *George Sand* for the author's name of a novel which she now wrote by herself. This was the famous "Indiana," which appeared in 1832, and at once placed her at the head of writers of her own style. "Valentine," "Lélia," "Jacques," "André" (one of her best), and many others rapidly followed, in all of them the central figure being the *femme incomprise*, a character the authoress knew but too well. Whatever the errors of her life, George Sand's sympathies were always good and her influence directed towards the right.

She even aspired to be a political and philosophical reformer, and her warm heart continually plunged her into socialist vagaries of impossibly absurd types. Her novels therefore gradually changed their tone. "Spiridion" (1839), "Pauline" (1840) may serve as types, the first of her philosophical rhapsodies, and the second of her socialist and republican aspirations. Each of these phases gave rise to numerous novels; and as the charm of imagination and style reigned throughout, her popularity carried her safely through all these intellectual dangers, and she became rich. Her first use of her fortune was to acquire a legal divorce from her husband, who really seems as much to blame as herself for the break-up of their connection (one cannot call such a marriage a union); and henceforth she occupied herself with the education of her two children at her estate of Nolant in Berri, or at Paris, varied by many journeys into Switzerland, Italy, &c. Her finest novel, "Consuelo," and its inferior "continuation" the "Princesse de Rudolstadt," appeared in 1842 and 1843 respectively, and she further developed socialist tendencies in the "Mennier d'Augibault" in 1845. A crowd of volumes of this new type now poured from her pen; but with the downfall of her political hopes by the failure of the movement of 1848 and the establishment of the organized treason called the Second Empire, her spirits flagged, and another type altogether succeeded to the rush of semi-political novels. This was a charming series of sketches of country life, "La Mare au Diable," "François le Champi," "La petite Fadette," &c. Nothing more felicitous, innocently simple, and altogether fascinating can be imagined. Perhaps these books are those which best commend themselves to English readers, ill-acustomed to red-hot socialism or apologies for breaches of domestic duty. The voluminous "Mémoires de ma Vie" (1854) are not much worth reading. George Sand lived till 1876, continuing hard at work at her profession till the end. Her books are not enduring, they are too superficial; but we are still sufficiently near to them to enjoy them. They reflect contemporary life as in a mirror; but the intense observation of De Balzac, the picturesqueness of Scott, the deep thoughtfulness of George Eliot, or the humour of Thackeray are completely absent from these books, charming as they are. They are "of their time," and must therefore perish with it.

Of the many liaisons of George Sand the two most famous are those with Alfred de Musset, the great poet, and Frédéric Chopin, the still greater musician. In each case the affair turned out most wretchedly, both parties becoming heartily miserable. The lady consoled herself by immolating her sorrows on the altar of authorship in two remarkable books, "Elle et Lui" (1834) and "Lucrezia Floriani" (1838), which give coloured versions of these two episodes in a very chequered career. A great habit of George Sand's was to wear a modification of man's clothes, rather more masculine than the famous "Bloomer" costume, and in many other things (smoking, for example) she affected mannish ways. Still she is one of those personages to whom one is irresistibly led to pardon much that in another woman would be unpardonable.

In 1884 a statue was erected to George Sand in La Clâtre, close to Nohant, her home. In 1885 a better monument was completed in the great collection of George Sand's letters (1812-1876), in six vols., and these were condensed into three vols. and translated into English in the following year by M. de Beaufort. The collection is full of absorbing interest, but is naturally silent upon those points where one would wish for explanations.

SAND GROUSE (Pteroclidæ) is a small family of birds belonging to the order GALLINÆ. The sand grouse differ in many important respects from the true Grouse (Tetrao), which belong to the family Tetraonidæ. They present certain analogies with the pigeons, and some authors consider that they should be made the type of a separate

order, Pterocletores. They have long pointed wings, a character which indicates considerable powers of flight. The tail is also elongated and pointed, and in some species the two middle tail-feathers are much prolonged. The tarsi are elongated, and clothed in front with short downy feathers; the hinder toe is quite rudimentary, and the three anterior toes are short and broad. The bill is neatly straight. The sand grouse are inhabitants of deserts and open barren plains in Africa, the Mediterranean region, India, and Central Asia. Though they are usually met with in large packs, they pair like the partridge. Their flight is very rapid, and as they are protectively coloured and very shy their capture is difficult. The flesh, especially that of the young birds, is good; and they may be successfully kept for ornament in an aviary.

The Banded Sand Grouse (*Pterocles arenarius*) is abundant in Northern Africa; it is also met with in Southern Russia, and stragglers have been killed in parts of Southern Europe. The general colour of this bird is yellowish-brown mixed with gray, and banded with brownish-black on the upper surface. The male has the belly, a band across the lower part of the breast, and a patch on the breast brownish-black; in the female the under parts are paler, and the throat bears a gray patch. The length of this bird is from 12 to 14 inches. The nest is placed in a hollow scraped in the sand, and contains three or four eggs. Their food consists of hard seeds and small insects.

The Pintailed Sand Grouse (*Pterocles alchata*) has a much stouter bill, and its central tail-feathers are greatly elongated. Its plumage is variegated with olive, yellowish, and reddish tints, and with black; the belly is white, and the breast bears a fulvous crescent edged with black; the tail is banded with brown. The length of the bird is about 14 inches. This species is found not only in Africa and Asia Minor, but also in Southern Europe, principally in Spain and the *landes* of France. In its habits it resembles the preceding species.

Pallas' Sand Grouse (*Syrhaptes paradoxus*) is a singular species, inhabiting the central parts of Asia, where it was discovered by the celebrated traveller, Pallas. The structure of the feet is very remarkable: the tarsi are short and thick, and entirely clothed with minute feathers; the hinder toe is entirely wanting, and the anterior toes are excessively short. In the male the two central feathers of the tail, as well as the first primary in each wing, are produced and thread-like. Its length varies from 9 to 11 inches. Individuals of this species are occasionally taken in the British Islands; and in the year 1863, they appeared in considerable numbers in Britain as well as on the continent of Europe. The nest is a hole scraped in the soil, and contains three eggs, elliptical, stone-buff in colour blotched with purple-brown. The upper parts are yellowish, mixed with gray and barred with dark brown and black; the wing coverts are buff bordered with chestnut, forming a conspicuous band along the wing; the throat is orange, and the lower parts buff with a broad dark band on the abdomen and flanks, and a narrow one on the chest.

SAND MARTIN (*Cotyle riparia*) is a well-known British bird of the SWALLOW family (Hirundinidæ). In this species the feet are very slender and scutellated; the bill short, depressed, and very wide at the base, and the tail nearly even, or merely notched at the extremity. The sand martin is the smallest of the British swallows, measuring less than 5 inches in length; the upper parts are of a uniform light brown colour, with the quill feathers of the wings and tail very dark or blackish-brown; the lower surface is pure white, with the exception of a brown band, which crosses the upper part of the breast; the feet and bill are dark brown; the wings, when closed, reach a little beyond the end of the tail.

The sand martin, or bank martin, as it is sometimes called, is very generally distributed over the British Islands,

but is still rather a local bird, and by no means so abundant as the chimney swallow or the house martin. It arrives in this country rather earlier than either of these species, having been noticed once or twice before the end of the month of March. It is well known in all parts of Europe, ranging as far north as Norway and Sweden; in Asia, it is met with in summer in the more temperate parts of Siberia, and it also occurs in India, and even in the Philippine Islands, whilst the European specimens retire into Africa like our other swallows. But this species

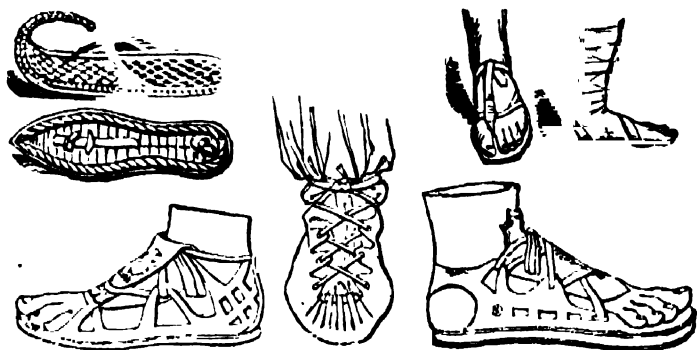
has a wider range than the two other British species of this family, for it inhabits both hemispheres, migrating from central and tropical America to the northward, as far even as the sixty-eighth degree of latitude. Wherever it occurs, its habits are the same; it frequents the banks of rivers, the sides of sand-pits, and similar places, where a perpendicular bank of soft earth affords it the opportunity of burrowing without much difficulty. In these situations it scoops out the earth to a depth of about 2 feet in a horizontal direction, forming a beautifully regular cylindrical tunnel—a labour which, considering that its bill and feet are the only tools which it has to work with, is certainly most surprising. In its nesting operations the bird clings with its feet to the surface of the sand or earth in every possible position, and uses its little bill as a pickaxe. The inner extremity of the burrow is slightly enlarged, and here a bed is prepared for the reception of the eggs, by the accumulation of a little loose hay and a few soft feathers. In a suitable station great numbers of these little galleries are excavated side by side, and the birds may be seen constantly coming in and out of the holes. The eggs are from four to six in number, and pure white. At least two broods are produced in the season. The sand martin leaves this country earlier than its allies, taking its departure about the beginning or middle of September. The habits of the sand martin in all other respects are similar to those of the swallows in general; they skim through the air with great ease and celerity, in pursuit of the insects on which they and their young are fed; and like the common swallow they are fond of the neighbourhood of water, into which they dip when on the wing, both to drink and wash themselves. According to White, the young are sometimes fed with crickets, as long as they are themselves, and on leaving the nest they are to be seen perched in a row upon a rail.

SANDAL-WOOD, yielded by one or more species of *Santalum*, is well known both in commerce and the arts as a fragrant smelling wood, whence it is used as incense, and employed in the manufacture of necklaces, fans, elegant boxes, and ornaments. It is a product of the coast of India, as well as of the Indian Archipelago.

Santalum album (white sandal wood) is a native of the mountainous parts of the coast of India. It forms a tree of rather small size, but much branched, which in general appearance has been often compared to the myrtle. The tree, when full-grown, is about 9 inches or a foot in diameter; it is then barked and cut into billets. The deeper the colour, and the nearer the root the more fragrant it is. As seen in commerce, it is in compact pieces of a white colour and agreeable odour, but with little taste. It is usually described as being the young and outer wood; the inner parts, as they grow older, become coloured towards the centre. This is reported to be the source of the yellow sandal wood, while the white sandal wood consists of the outer and younger wood of the same tree. Sandal wood was used in the construction of the temples in India, and is mentioned in a Vedic writing dating from the fifth

century B.C. A fragrant oil is extracted from the roots. The genus gives its name to the order *SANTALACEÆ*.

SANDALS is a term applied loosely in modern usage to any protection for the feet consisting mainly of a sole, and straps or bands with which to fasten it; differing from boots or shoes in that the latter have sides covering the feet. With the ancients, however, the term was restricted to those varieties of foot gear which had straps between the toes as well as upper straps. The Greeks largely walked barefoot, but used sandals on ceremonious occasions,



Sandals.

very rarely boots. The Romans hardly ever went barefoot, used sandals only in the house, or out of doors when not engaged on works of ceremony, always adopting boots as part of an official dress.

SANDARACH or **SANDARACH RESIN**, a dry, semitransparent, friable, tasteless, yellowish-white resin, imported from Northern Africa, where it exudes from the bark of the Sandarach tree (*Callitris quadrivalvis*). It is soluble in oil of turpentine, and if sprinkled over red-hot coals gives forth an agreeable and balsamic odour. When finely powdered it is used as *pounce*, to fill up erasures in writing paper. It is almost totally soluble in alcohol, and has all the characteristics of other resins. With alcohol it makes a white varnish, which is used in delicate work.

SAND-BLAST, the name given to a remarkable process, in which grinding or abrasion is effected by the percussion of small hard particles on a plain surface. Mr. Tilghman, of Philadelphia, received the Franklin Institute medal in 1872 for first applying it to practical purposes, and the operation excited great interest when shown in the London International Exhibition of 1873. The process consists in impelling with great force a jet of sand by a blast artificially produced (of steam in some cases, of air in others), against the stone or other substance to be acted upon. A hole $1\frac{1}{2}$ inch diameter by $1\frac{1}{2}$ inch deep has been bored completely through a solid piece of corundum (one of the hardest minerals known, next to the diamond) in twenty-five minutes, by sand driven with steam power at 300 lbs. pressure on the square inch. A pressure of 125 lbs. on the square inch cuts into granite at the rate of $1\frac{1}{2}$ inch deep per minute, or 3 inches into marble, or 10 inches into soft brown sandstone. A jet at 100 lbs. pressure will bore right through a hard steel file quarter-inch thick in ten minutes. It is remarkable that the particles of sand will cut hard stone, glass, or steel, but not soft substances—a result due to the fact that each particle makes a minute cavity at once by direct impact, when the receiving surface is hard, whereas a softer substance acts as a buffer or elastic rebounding cushion. A plate of glass covered with wire-gauze may, by the action of the jet, be pierced and converted into glass-gauze—a curious effect obtainable by no other known means. Instead of actual perforations, the glass may be made to present a perfect pattern in polished lines on a ground surface by placing a piece of fine lace upon it, and then acting with the sand-

jet. Glass copies of engraved prints may be obtained; a photographic negative of the engraving is taken on glass coated with bichromatized gelatin; a jet of very fine sand, propelled by a moderate blast, will eat away the surface proportionately to the thickness of the gelatin in different parts; and thus the picture is reproduced in a kind of semi-ground or unequally-ground glass. The process can be applied in various useful ways in the mechanical arts, such as dressing the surface of stone, and cleaning and preparing for tinning the inside of cast-iron hollow ware. Whether the processes be cutting, boring, drilling, grinding, demolishing, or engraving, they are one in principle—grinding by concussion.

SAND-BOX TREE (*Suria crepitans*) is a tree abounding with milky juice. It is a native of the West Indies, Mexico, and Guiana, where it is also called Monkey's Dinner-bell. The fruit of this tree is a depressed woody capsule, as large as a medium-sized apple, with from twelve to eighteen furrows, which separate into as many cocci; each of these separates into two valves, and, when dry and fully ripe, flies asunder with great elasticity and a loud report like a pistol. The juice of the plant is exceedingly acid, and a small quantity touching the eye will produce blindness. The seeds contain an acrid oil which is a drastic and dangerous cathartic. The tree grows to a height of 30 or 40 feet, and is often planted throughout the tropics as a shade tree. The flowers are small, reddish, and have pistils only, or stamens only, which kinds occur on different trees.

SAND-EEL. See LAUNCE.

SANDEMA'NIANS. See GLASSITES.

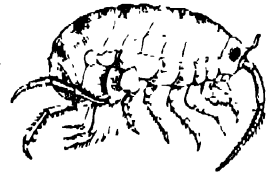
SAND'ERLING (*Calidris*), a genus of birds belonging to the snipe family (SCOLOPACIDÆ), distinguished from the genus *Tringa* by the absence of the hind toe. The Common Sanderling (*Calidris arenaria*) is a pretty, lively little bird, well-known as a bird of passage on the coasts of Britain. The sanderling breeds in the arctic regions, migrating southwards for the winter. It arrives on our coasts about the beginning of August; the majority do not stay in this country during the winter, but go further south, and return on their passage to their breeding-grounds about April. Its migrations extend to Ceylon, China, and Borneo in Asia, Cape Colony in Africa, and Patagonia in America. The length to the end of the tail is $7\frac{1}{2}$ inches; the extent of the wings is about 16 inches. In winter the upper parts are pale gray, with dusky lines; the lower white; the wings black and gray with a white band. In summer the upper parts are variegated with black and red; the lower red in front and white behind. In Britain the sanderling frequents sandy shores, usually in the company of the dunlin or some of the smaller plovers. It feeds on small molluscs, crustaceans, and sea-worms. The female deposits, in a slight nest made in a willow, two eggs, greenish-buff in colour, spotted with brown. The flesh is esteemed for the table.

SAN'DERS-WOOD or SAUNDERS-WOOD is an old name for SANDAL-WOOD. Red sanders-wood is derived from a species of PTEROCARPUS.

SAND GATE, 83 miles from London, being 3 miles from the Folkestone station of the South-eastern Railway, is a picturesque watering-place of England, in the county of Kent, now much resorted to for bathing. Besides the usual places of worship there are schools, a literary institute, libraries, reading-rooms, baths, and a dispensary. Shorncliffe military camp is established on the heights above the town. The camp has accommodation for 6000 men, is well drained, and has a good water supply. There is a castle at Sandgate built by Henry VIII. The resident population in 1881 was 557.

SAND'HOPPER (*Talitrus locusta*) is a small well-known crustacean, very abundant on all the sandy shores of Britain. It belongs to the subclass EUBRANCHIATA,

or fixed-eyed crustaceans, and to the order Amphipoda, a group in which the abdomen is well developed, furnished with limbs, and having the branchial or breathing organs confined to the thoracic legs. The sandhoppers are found in great numbers under stones, or under the decaying seaweeds thrown up on the beach by the tide, and when disturbed leap with great agility. At times they occur in such countless swarms as to give the appearance of a thick mist at the water's edge as they bound into the air to a considerable height. They never enter the water, but burrow in damp sand. Another common British sandhopper belongs to the nearly allied genus *Orchestia*, some tropical species of which live far inland.



Common Sandhopper.

SAND'HURST, a pleasant village near Wokingham, Berks, about 30 miles from London, where is situated the Royal Military College for the education of gentlemen cadets, chiefly the sons of military officers. This college was originally founded in 1802, at Great Marlow, Bucks; but in 1812 it was removed to its present site. The building presents a splendid appearance. It has one grand front, with two wings, and in the rear of the college is a large square, with houses for the residence of the officers of the establishment. The arrangements of the college have undergone several alterations since its foundation. It was at first divided into senior and junior departments, and in 1858 the latter was remodelled and called the Cadets' College. Boys were then allowed to enter at the age of sixteen, and received a military education grafted on the groundwork of general instruction. This continued until December, 1870, when it terminated in consequence of changes recommended in the constitution and regulations of the college by the Royal Commission on Military Education. The college is at present used for the military education and training of young gentlemen who have passed the examination for direct commissions and are awaiting their appointment to regiments. To the college are attached a chapel, riding-school, and gymnasium. Wellington College, on the slope of Edgebarrow Hill, was founded in 1856 for orphan sons of officers. Broadmoor Criminal Lunatic Asylum is 2 miles distant.

SAND'HURST (familiarily *Bendigo*), a city of Victoria, Australia, on Bendigo Creek, on the main line of railway between Melbourne and Echuca, 100 $\frac{1}{2}$ miles N.W. of the former and 56 south of the latter. It is the headquarters of a rich auriferous country, in which there are at present about 800 quartz mining leases. The city is divided into the three wards—Sutton, Darling, and Barkly; its main street, named Pall Mall, has fine shops and stores, the opposite side being occupied by Rosalind Park. Numerous churches, hospitals, mechanics' institute, theatres, government and municipal offices are the chief buildings. The municipality has an area of 7500 acres, and a population in 1881 of 28,128. The district is the see of a Roman Catholic bishopric.

SAND'ORICUM, a genus of plants of the order MELIACEÆ. The genus contains only a single species, found in the tropical parts of Asia, *Sandoricum indum*. The fruit is acid, and sufficiently agreeable to be mixed with syrups to make cooling drinks; its root is bitter, and used as medicine in bowel complaints.

SAND'PIPER (Totanina) is a subfamily of the great snipe family SCOLOPACIDÆ. The Common Sandpiper (*Totanus hypoleucos*), or summer snipe, is a beautiful little bird which periodically visits Britain, appearing in April and departing about the end of September. In the

south and south-east of England the sandpiper is only known as a bird of passage; but in Wales, the north of England, Scotland, and to a less extent in Ireland, it breeds by the margins of lakes, rivers, brooks, &c. It is a widely distributed species, visiting nearly the whole of the Old World. The nest is composed of moss and dry leaves, and placed in a hole on the bank, under the shelter of a tuft of rushes or grass, or at the root of a tree; it contains four eggs, reddish-white, with brownish spots. The sandpiper, like its allies, is active and graceful in its movements. It swims and dives well. Its food consists of worms and insects. It is about $7\frac{1}{2}$ inches long. The plumage is greenish-brown above, with a blackish bar on each feather; the primaries are nearly black; the under surface is a delicate white, but the sides of the neck and the upper part of the breast are pale ash, streaked with dusky black; the legs are ashy-green. The Green Sandpiper (*Totanus ochropus*) is a well-known bird of passage in England, but rarely, if ever, breeds in this country. The name is derived from the greenish-black colour of its legs. It is $9\frac{1}{2}$ inches in length. The Wood Sandpiper (*Totanus glaucola*), a slightly smaller species, also visits this country on its way from its breeding grounds, though it is less common than the former species. Its legs are yellowish olive in colour. Other British species of Totanus are the REDSHANK (*Totanus calidris*) and the GREENSHANK (*Totanus glottis*).

The Purple Sandpiper (*Tringa striata*) belongs to a genus distinguished by having the toes slightly webbed at the base. It is found on British coasts in rocky places from September to April or May, when the majority go further north to breed. It feeds on shrimps, sandhoppers, small crabs, molluscs, &c. In winter it is of a general bluish-lead colour. It is $8\frac{1}{2}$ inches in length. It is common in North America and Northern Europe. The Curlew Sandpiper (*Tringa subarquata*) visits our coasts on its autumnal migration, but does not remain through the winter. The DUNLIN (*Tringa alpina*), Little STINT (*Tringa minuta*), and KNOT (*Tringa canutus*), are other British species of sandpipers. The Broad-billed Sandpiper (*Limicola platyrhynchos*) is distinguished by its bill, which is much longer than the head, very broad throughout its length, and rounded at the tip. This species breeds in Norway and Sweden, and visits Germany, France, Italy, and other parts of Europe; but in the British Isles it is only known as a rare straggler.

The SANDERLING (*Calidris arenaria*), the RUFF (*Machetes pugnax*), and the GODWITS (*Limosa*) also belong to the subfamily Totaninæ.

SANDRINGHAM, a parish in the county of Norfolk, $3\frac{1}{2}$ miles north-east of Castle Rising. It contains the principal country residence and farm of the Prince of Wales.

SAND-SMELT. See **AITHERINE**.

SAND-STONE, a rock consisting of consolidated sand. The particles are cemented together by various kinds of mineral matter, and the compactness is frequently increased by pressure or even by heat. One of the most common cementing materials is the oxide of iron, which produces—partly in conjunction with the corresponding compound of manganese—the various familiar shades of yellow, brown, and red. Silica or quartz also serves this purpose in many cases, and carbonate of lime is occasionally met with in addition. The *arkose* of Belgium is mainly cemented by decomposed felspar (kaolin); and a Triassic sandstone at Alderly Edge, in Cheshire, is brightly coloured by green, blue, and brownish compounds of copper, cobalt, and nickel.

The most compact sandstones, with a silicious cement, are known under the name of **QUARTZITE**; and the less compact but still massive varieties, with angular grains, fall under the denomination of **Grit**. When the rock readily splits into thin slabs, owing to the presence of numerous parallel layers of mica flakes, it is technically

termed *flagstone*; and when, in a comparatively soft stone, there are no definite traces of bedding, so that the rock can be worked with equal facility in any direction, the requisite conditions are satisfied for a good *freestone*. The more important sandstones of economic value are referred to under their respective names.

SAND-WASP (Sphegidae) is a family of hymenopterous insects belonging to the section Fossores. This family is distinguished by having an elongated abdomen attached to the thorax by a long thin stalk; the legs are long, and adapted for digging, the anterior tibia and tarsi being strongly ciliated; the antennæ are long and thread-like. The species, especially those inhabiting tropical countries, are very large, and some are brilliantly coloured.

The Common British Sand-wasp (*Amnophila sabulosa*) is very abundant in sandy places in this country. The female makes a burrow with its jaws in the sand; in this she stores large caterpillars, and even large spiders, to serve as food to the young when hatched. The burrow, when provided with victims, is closed with sand and stones. This species is nearly an inch in length, black in colour, except the second and third segments of the abdomen, which are red. Some of the tropical species of the genus *Spheg* are among the largest of hymenopterous insects. Another genus belonging to this family is *Pelopæus*, the species of which construct many-celled nests of fine earth in barns, &c.

SANDWICH, a municipal borough and Cinque Port of England, in the county of Kent, situated 98 miles from London by the South-eastern Railway, near the east coast, and on the south side of the Stour, at its entrance into Pegwell Bay. It is a very ancient town, and had once such a fine harbour that at the commencement of the eleventh century it was described as the most famous of all the English harbours—"Omnium Anglorum portuum famosissimus." In the reign of Edward IV. its customs duties yielded £17,000 per annum, and 95 ships and 1500 sailors belonged to it. The harbour had, however, begun to fill up before the reign of Edward VI., and in that of Elizabeth it was almost entirely destroyed, although for some time afterwards it continued of importance from the fact of a number of French and Flemish refugees settling here. Only vessels of small draught can now get up to Sandwich. The streets are irregular, and the houses antique. There are two ancient churches, one, St. Clement's, a Norman tower, restored in 1866. There are also a third parish church, a guildhall, two hospitals, and several dissenting chapels. At spring tides the Stour at this point is about 11 feet in depth and 150 feet across. At present the trade of the port is very little, the chief export being agricultural produce. Coal, iron, and timber are the chief articles imported. The municipal borough is governed by four aldermen and twelve councillors. The population of the town and port in 1881 was 2846. The parliamentary representation of Sandwich was abolished under the Redistribution of Seats Act in 1885, and the borough merged in the county.

A short distance from Sandwich is Richborough Castle, the ancient *Ruternium*, a massive building, with walls 12 feet thick, erected in the reign of Vespasian, which has seen some hard service, and still survives in ruin, after an existence of nearly 2000 years. There is also a Roman amphitheatre in the neighbourhood. The old walls of the town have been converted into a promenade, which, with the venerable Fisher's Gate, are all that remain of the fortifications. The house where Queen Elizabeth resided in 1572, and a curiously carved house of the age of Henry VIII. are also still in existence.

SANDWICH or HAWAIIAN ISLANDS, a group of islands in the Pacific Ocean, between 19° and 22° N. lat., 155° and 161° W. lon. They consist of thirteen, of which four are large, viz., Hawaii, Maui, Oahu, and Kauai,

and seven inhabited. In order, from east to west, these

	Area, Sq miles.
Hawaii,	4850
Mau,	760
Molokai,	180
Lanai,	180
Oahu,	700
Kauai,	770
Niuhau,	119

They are generally of volcanic origin, with lofty peaks the culminating point of which, Mauna Kea, on Hawaii, is 13,953 feet high. Mauna Loa (13,760 feet), another peak in the same locality, is active, and sent forth a great eruption in 1852. The surface is generally rugged, but has many fertile valleys; and on Oahu, the best cultivated and peopled of the group, is a large and productive plain. The inhabitants, owing to the exertions of missionaries, chiefly American, and the advantageous position of the group on the route between China, Australia, and California, and the whaling-grounds of the Pacific, have made great progress in civilization, and carry on a considerable trade with California, British Columbia, Japan, and China, exporting sugar, rice, coffee, pulu or vegetable silk, and sandalwood. The climate is highly salubrious, and the range of temperature from 60 to 90° Fahr. The chief products are coffee, cocoa, cotton, arrow-root, sugar, tobacco, sweet potatoes, and wheat, of which fine crops are raised. The higher grounds are well adapted for grazing. By a treaty, signed 10th July, 1851, friendly relations were established with Great Britain. These islands were discovered by Captain Cook in January, 1778 (who perished at Hawaii), and were named from Earl Sandwich, then First Lord of the Admiralty.

The population in 1878 amounted to 57,985 souls. This showed since the census of 1872 an increase of 18088. The native population is, however, decreasing, the number of inhabitants born in the islands having sunk from 51,531 to 17,530. Of the foreigners settled in the country the Chinese are most numerous, their number in 1878 amounting to 5916. The Americans come next, being 1276 in number; while the number of British subjects in the islands was 833. See HAWAII.

SANGAREE', a beverage drunk in the West Indies and the United States, sweetened and spiced, and sometimes iced. It consists of Madeira wine, syrup, water, and nutmeg.

SANGIR' ISLANDS, a volcanic group, about fifty in number, situated to the north of the Celebes, and forming a dependency of the kingdom of the Netherlands. They are nearly all inhabited, the total population being estimated at 80,000. The soil is fertile, and produces sago, cocoa-nuts, maize, rice, tobacco, cocoa, and sugar. The inhabitants—who belong to the Malay race—have been partially converted to Christianity, but they are for the most part cunning, lazy, and dirty.

SANGUINARIA, a genus of plants of the order PARAVRACEÆ, which includes the *Sanguinaria canadensis*, blood-root or Puccoon of North America, a plant famous for the narcotic, emetic, and purgative properties of its root-stock, and much used as a medicine in the United States. The fleshy root-stock creeps along underground, and abounds in an orange-coloured juice, which was formerly used by the Indians in smearing their bodies. The flower is white, large, and conspicuous, and as it appears in spring it is useful for borders. There are two sepals, eight to twelve petals, about twenty-four stamens, a style with two stigmas, and a capsule with two deciduous valves.

SANGUINARINE, an alkaloid obtained from the roots of *Sanguinaria canadensis*, or blood-root, natural

order Papaveraceæ. It is also present in two other plants of the same order, the *Chelidonium majus* or commoncelandine, and the *Glaucium luteum* or yellow-horned poppy. It crystallizes in colourless needles, having the formula $C H_{12} NO_4$, and is soluble in alcohol and ether, but insoluble in water. It unites with acids, forming neutral crystallizable salts, the solutions of which are orange red, and in which iodine gives a crimson precipitate. It is used in medicine in doses of a quarter grain to a grain as a stimulant, tonic, and sedative; in large doses it is an emetic.

SANGUISOR'BA, the name of a genus of plants belonging to the order ROSACEÆ. Most of the species possess astringent properties. The Common Burnet (*Sanguisorba officinalis*) is a native of Britain. It was formerly cultivated to some extent, but has been superseded by sainfoin and other artificial grasses.

SAN'HEDRIM or **SANHEDRIN** (Gr. *Synhedrion*), the great council of the Jews, which consisted of seventy-one members, and decided both ecclesiastical and civil causes. The name is a corruption by the Talmudists of the Greek *synhedrion*, a council. The Sanhedrim had a president, who was generally the high priest, and a vice-president. The other members were the chief priests, elders, and scribes, or men of learning. Either capital or minor punishments might be inflicted by the council; but under the Roman government its power was so far restricted that a capital sentence required the confirmation of the Roman governor, who was also charged with its execution.

Besides the Sanhedrim at Jerusalem, there were inferior courts in each town of Judea, consisting of twenty-three members, to which the same name is sometimes applied. From these courts an appeal could be made to the head Sanhedrim. The Rabbis trace the origin of the Sanhedrim to the days of Moses, but it is first mentioned in the time of Hyrcanus II. After the destruction of Jerusalem the seat of the Sanhedrim was changed several times, and it finally became extinct at Tiberias with the execution of Gamaliel VI., the last president, A.D. 125.

SAN IDINE (Gr. *sanis*, a board) is a glassy variety of ORTHOCLASE felspar occurring as transparent crystals in many volcanic rocks. The crystalline form is usually tabular, and hence the scientific name.

SANITARY LEGISLATION. The application of the principles of health, though a science as old as humanity, has only attained a recognized position very recently. That which affects the individual alone is left to each person's free will, and the state only interferes in grave instances; but everywhere a strong feeling has of late years grown up that the general health is one of the most important cares of a government. The tendency of men to collect for their exclusive profit in large cities, and the immense development of trade, have aggravated the causes of infection, and created the duty of protecting the population against the multifold causes of insalubrity. Legislation has consequently become more and more severe in framing repressive or preventive laws. In the present article we propose to review the principles on which this legislation is founded, and to glance at the main features of the most recent sanitary Acts.

The causes of deterioration and disease may be divided into two classes—social and material. The material causes are principally impure air, impure water, insufficient and unwholesome food, dampness of soil, deficiency of warmth, &c.; and the removal of these causes is the principal aim of practical hygiene as enforced by legislative enactments.

The social causes of deterioration and disease are but slightly, if at all, controlled by state interference. The most powerful are intemperance, immorality, injudicious marriages, excesses of every description, overwork, idleness, and depressing passions. The removal of these must chiefly depend on individual and combined efforts dictated by a

sense of duty. Much good in this direction may also be achieved by the effects of education through the various channels of the school, the pulpit, the platform, and the public press.

The material essentials of health are very simple. They consist of air, water, food, habitations, clothing, and fire—the four first-mentioned being those chiefly affected by legislative enactments.

Statistical inquiries on mortality prove beyond a doubt that of the causes of death which usually are in action, impurity of air is the most important. Such impurities are very numerous, but may be broadly classified into (1) suspended matters, (2) gaseous substances, (3) special impurities.

Among suspended matters are found an immense number of substances, organic and inorganic; but the most prolific sources of injury are undoubtedly the works and habitations of man. In all inhabited rooms not perfectly ventilated there are borne in fine particles in the air, scaly epithelia, single and tessellated, round cells like nuclei, portions of fibres (cotton, linen, wool), and of food, bits of human hair, wool, and coal. Pluck wall-papers, coloured green by arsenical preparations, give off little particles of arsenical dust, which I have often been the causes of arsenical poisoning. The air of sick rooms is vitiated by abundant exhalations from sick bodies and by effluvia from discharged excretions, in addition to impurity arising from respiration. The air of workshops and factories is affected by dust proceeding from the grinding of steel, iron, paint, and stones; the making of mottos and pearl buttons; by melting zinc and solder; by carding and spinning textile fabrics of all kinds; by making cement, and by innumerable other causes.

The principal gaseous substances passing into the air, either from natural causes or from the works of man, are various compounds of carbon, sulphur, chlorine, nitrogen, and phosphorus; such as carbonic sulphurous and sulphuric, hydrochloric, nitrous and nitric acids, and phosphuretted hydrogen. Many of these gases, in addition to their directly injurious action on the human system, act as a deadly poison on vegetation, whilst the smelting of copper ore renders a country sterile for miles around.

Under the head of special impurities we may class air vitiated by respiration, by combustion, by effluvia from sewage matter and the air of sewers, by certain trades, the air of towns, of churchyards, and of mines. An adult in ordinary work gives off in twenty-four hours from 12 to 16 cubic feet of carbonic acid gas; and the experiments of Dr. Angus Smith proved that 3 per cent. of this in the air was sufficient to produce great feebleness of the circulation, slowness of the heart's action, and quickened respiration. From 25 to 40 ounces of water also pass off from the skin and lungs in twenty-four hours. The products of firing pass out into the external air, while those of lighting are usually allowed to pervade the room, with a very injurious effect upon health, especially in the case of workshops, factories, and some places of public assembly; and it is to be observed that it is by no means follows, because no immediate pain or discomfort is experienced in a vitiated atmosphere, that therefore no harm has been done. The air of cess-pools and sewers has frequently been productive of serious and fatal results, and the most prolific causes of diarrhoea, cholera, and typhoid fever are the mephitic gases issuing from uncleaned or blocked-up drains. It has also been found that the vapours given off from thickly-crowded graveyards, if not directly productive of disease, do certainly increase the sick and death-rate of the immediate neighbourhood.

It is notorious, too, that certain employments condemn the workers in them to an untimely grave. The habitual inhalation of coal-dust in mines results in what is called the "black-lung;" while the deaths from pulmonary disease among workmen in metalliferous mines after the

age of thirty-five is at the rate of fifty, as compared with seventeen among males not employed in mines. Workmen in the pottery trade, china scourers, grinders of steel, button-makers, pin-pointers, electro-platers, workpeople in flux and shoddy manufactories, in the carding-rooms of cotton and wool, silk-spinners, in some parts of glass-making, and the making of grinding-stones, sandpaper, cement, matches, and the fabricators of many medical compounds, all suffer from diseases consequent upon their occupations. In most of these employments the sick-rate and death-rate could both be largely reduced by proper ventilation, and by introducing suitable appliances to protect the workmen from the inhalation of fine dust or noxious fumes. The workpeople themselves are often as obstructive and indifferent as their masters to the adoption of measures calculated to ameliorate their unhealthy surrounding conditions; hence the only remedy for these widespread evils must be supplied from without by vigorous sanitary inspection under the provisions of sanitary laws.

Water is the second most important sanitary element; and with an avoidance of waste it is desirable that the supply should err on the side of excess. The supply to London averages 30 gallons daily per head; to fourteen English towns of second-rate magnitude, 24 gallons; soldiers are allowed 15 gallons daily; in hospitals, from 40 to 50 gallons per head are often used; and with the more general adoption of baths in ordinary houses, the supply in our large towns will have a tendency to increase, especially as the constant supply is gradually introduced. Glasgow, with its 50 gallons per day, appears the town of most abundant supply. A good and wholesome water should be clear, transparent, well aerated, without taste or smell, and free from suspended matters; and the great object of sanitary legislation in regard to water is not to provide a supply, which is generally better done by private enterprise, but to prevent the organized sources of supply from being contaminated by the residuum of industrial establishments, town sewage, &c., and to enable local authorities to provide adequate supplies for their districts in case of necessity. One sanitary reform often leads directly to another equally useful; and the enforcement of the Acts to prevent the pollution of our rivers, by leading scientific men to devise other means of disposing of town sewage, has furnished us with disposable manure of great value. Sewage utilization, as will be seen in the article on that subject, has not yet reached its full development; but it has already been the means of transforming many streams which formerly were a sickening putrescent spectacle and the cause of wholesale disease and death, into waters of clear limpid transparency, which give a charm to their scenery and provide a wholesome source of supply for drinking and other purposes.

In the article on Food we have already considered the essentials of this important sanitary element. So great is the influence of food on health, that some writers have reduced genuine hygiene almost to a branch of dietetics. Happiness, as well as health, is considered to be insured or imperilled by a good or improper diet; and high moral considerations are supposed to be involved in the due performance of digestion. Sanitary legislation, without providing or dictating the food of the people, aims at securing that what is supplied shall at least be pure. To this end the Adulteration of Food Act of 1872 was passed, and stringent clauses were also introduced into the Licensing Act of 1871, rendering adulteration by publicans punishable by severe penalties. The Sale of Food and Drugs Act of 1875 provided for the more strict examination of tea, coffee, and other articles by public analysts, and for the inspection of tea when in bond by the customs authorities; while the Pollution of Rivers Act of 1876 has done something to facilitate a more wholesome water supply.

As regards habitations, the evils arising from over-

crowded dwellings have proved the more difficult of cure, owing to the reluctance of working people and others to live according to the principles of sanitary science. Landlords who have generously built model cottages have found the tenants, instead of using the proper number of bedrooms, huddling together in one room, and using the others merely to store apples and potatoes. In some parts of Scotland improvement commissioners have spent thousands in destroying houses unfit for habitation; but in the more healthy suburbs people have speedily rendered good houses miserable by their habits. It has been ascertained that for every twelve children who grow up healthy in the rich districts of London, only one child grows up among the poor. Making every allowance for other causes, there can be no doubt that the main cause of this frightful waste of life is the close and poisoned air which the children breathe in their overcrowded hovels. Experience shows, moreover, that it is not mere density of population which causes the evil. In the worst districts of London the density of population is about 300 per acre; but some of the modern Industrial Dwellings Companies have built houses providing for 1600 persons on an acre, and yet the death-rate in them is as low as 15 per 1000. The mischief lies in the vicious construction of dwellings. It should be added to these considerations that, as the moral nature is even more sensitive than the physical, these statistics must represent a still more grievous moral degradation in the inhabitants of such districts. All religious or moral agencies must be comparatively powerless under such conditions of life. The evil is one which loudly cries for the intervention of the legislature, for it is impossible to regard without the intensest solicitude the degeneracy of race which must be the inevitable result of such conditions. Broad chests and powerful limbs must be preserved at any price, and these can never come from the bloodless, slender, distorted children who manage to survive the wretchedness of overcrowded dwellings.

It was therefore on the ground of urgent sanitary necessity that Mr. Cross succeeded in 1875 in passing the Artisans' Dwellings Act, which provides, under certain conditions, for the very summary destruction of the rookeries and fever-dens of London and some other of our large towns. The primary agents for setting this Act in operation are the local medical officers, who are empowered to report to the local authority whether a given district is unhealthy, whether disease prevails there in consequence of the badness of the dwellings, and whether, therefore, an improvement scheme ought not to be framed for it. The local authority (consisting of the Metropolitan Board in London, of the town council in other places), if satisfied of the truth of the report, have to take steps for otherwise accommodating the population within the given area with suitable dwellings either on the site of the old ones or elsewhere, compulsory powers of taking land for the purpose being granted. To encourage municipal bodies, however, to build dwelling-houses at philanthropic rents would simply be teaching people the pernicious lesson, "If you do not take care of yourselves the state will take care of you." The Act therefore provides that the local authority shall only build in the event of there being no probability of commercial enterprise accepting the offer of doing so. In this there is one end kept in view which ought to pervade all such legislation—viz., that in improving the physical condition of the working classes, it is very necessary that special care be taken not to damage their moral independence.

With regard to the other sanitary evils to which we first alluded, there has long existed in England a conviction of the necessity of dealing with them by means of legislative enactment. To Dr. Southwood Smith is mainly due the honour of first awakening the public mind to the matter by the publication of his "Philosophy of Health," in 1832.

Subsequently numerous laws were passed dealing with specific abuses, the principal being as follows:—

Factory Acts,	1844-70
Nuisances Removal Acts,	1845-60
Baths and Washhouses Acts,	1847
Common Lodging Houses Acts,	1851-53
Smoke Nuisance Abatement Act,	1853
Interment Acts,	1850-55
Diseases Prevention Act,	1855
Bakehouse Regulation Act,	1863
Artisans' and Labourers' Dwellings Act,	1868
Mines Regulation Act,	1872
Public Health Act,	1872
Adulteration Act (Food, Drink, & Drugs),	1872
Artisans' and Labourers' Dwellings Act,	1875
Public Health Act,	1875
Sale of Food and Drugs Act,	1875
Pollution of Rivers Act,	1876
The Contagious Diseases (Animals) Act,	1878
The Public Health (Water) Act,	1878

In many instances the Acts were altogether inoperative, through the absence of any definitely-constituted authority charged with the duty or having the power of enforcing them. In 1872, therefore, the Public Health Act was passed, the chief feature of which was the division of England into urban or rural districts, and the appointment in each district of a sanitary authority. The most important appointment in the hands of the sanitary authority was that of medical officer, who may act for one or for joint districts. Under the terms of the Act, he must have a diploma in medicine or surgery, and be a competent analytical chemist. He requires for the due execution of his duties a thorough local knowledge of the movement of population, of the ages and occupations of the people, of the geological formation of the lands, of the water-shed, of the daily meteorological conditions, of the water supply, of the habitations of the people, and of the construction and conditions of drains and sewers. He has to keep a daily record and periodical tabulation of the mortality returns, and a local classification of the places of excessive mortality; to give a constant attention to the character of the food supplies of the district, and have a technical knowledge of their quality. He must also possess a knowledge of the obligations of landlord and tenant, and a clear apprehension of the laws relating to public health and local government, in order that he may fulfil the most important of all his functions—that of medical adviser to the local authority.

A brief experience having shown that it was desirable in some respects to modify the Act of 1872, it was repealed in 1875, and replaced by a more complete law, containing all the best features of the first—especially as regards the medical officer, the sanitary authority, &c.; and, in addition, important clauses to secure the furnishing or protection of district water supplies, the inspection of food and milk, the ventilation of premises, and the prevention of the spread of infectious diseases.

The Local Government Board is the body responsible for the general working of the Act, and in rural districts the sanitary authorities are the various boards of guardians. In towns it may be the corporation or vestry board. Medical officers are the most important officials concerned with the working of the Act, and these may be appointed by areas sufficiently extensive to occupy their whole time. If the local sanitary board is willing to give the Local Government Board a voice in his appointment, the Board pays half the medical officer's salary. Thus many districts have been induced to combine and employ the same officer, with the result of a nearer approach to unity and efficiency of sanitary administration. The annual reports of the various medical officers as to the sanitary conditions and progress

of their districts, are documents of the utmost value to the social well-being of the country; and from the experience embodied in them the Local Government Board was able, in 1878, to frame a series of model by-laws for the guidance of the sanitary authorities throughout the country. The reports have also aroused an increased interest in sanitary improvement, and have been the means of stimulating the authorities of many unwholesome districts into commendable activity.

From what we have said it will be seen that the importance of sanitary measures cannot well be overrated, although very great care is needed to avoid undue centralization and the impairment of local self-government and individual effort. And although sanitary improvement has mainly the material well-being in view, its attainment is calculated to lead to higher and equally desirable ends; for the man whose food is no longer an unwholesome concoction, and whose lungs do not breathe a vitiated and impure atmosphere, is better disposed to accept the higher teaching which strives, not without success, to combat moral infection.

SANITAS, a disinfectant obtained from the rapid oxidation of some essential oils, especially those of eucalyptus and turpentine. It owes its properties to the presence of peroxide of hydrogen.

SAN KHYA, a Hindu system of philosophy, and probably the oldest of the three great Hindu systems. (The other two are the Mimansa and the Nyaya.) It is almost entirely non-theistic, to remedy which the theistic *Yoga* system was superimposed upon it. The object of the Sankhya is to teach how to attain eternal repose and blessedness, and the means it uses is an exhaustive analysis of the principles of the universe, numbering, according to its tenets, exactly twenty-five. The first principle is nature, then follow in order mind, consciousness, the elements, the senses, and last of all the soul. Creation is defined as the union between the first and last principles, nature and the soul. According to the variation constituents, the virtuous gods, the passionate demons, or the mixed beings called men, are produced. The duty of the soul is to work out its liberation and purification.

SAN QUHAR, a royal burgh of Scotland, in the county of Dumfries, situated on the Nith, 27 miles north-west from Dumfries, and 4 miles from the Kirkcudbright station of the Caledonian Railway. It has a handsome parish church, erected in 1820, a Baptist chapel, an Evangelical Union church, and two U.P. places of worship; a town-hall, savings bank, and a subscription library. There are manufactures of bricks and tiles, carpets, and agricultural implements. There are some extensive coal-fields in the vicinity, and at Wauluckhead, not far distant, some lead mines. Population of the parish, 3109; of the burgh, 1339. The burgh is governed by a provost, two bailies, a dean of guild, a treasurer, and four councillors. Sanguar probably from *room-cave*, old fort, seems to have derived its origin from its fine old castle, now in ruins. This, which formerly belonged to the lords of Sanguar, having been purchased in 1630 by an ancestor of the last Duke of Queensberry, became, on the demise of the latter, with other vast possessions in Dumfriesshire, the property of the family of Buccleuch. It was created a royal burgh in 1576. It is the *Corda* of the Selgovæ.

SANSCULOTTES, the name flung in scorn at the ill-clad (literally "trousersless") mobs of the great French Revolution by the offended aristocrats. It was adopted as a fierce badge to be proudly welcomed, and though not literally to be acted up to, yet to be fully met in spirit, so far as the cultivation of coarse clothing was concerned. To be somewhat ill-dressed and slovenly was the mark of a good patriot. Robespierre stood almost alone in his party in his persistent recognition of the older canons of gentlemen's dress.

SANSCULOT'TIDES, the five extra days (or in leap-year, six) required to make out the year in the French Republican Calendar, which only provided twelve months of thirty days each. The Sansculottides were inserted before the month Vendémiaire.

SANSEVIERIA, a genus of plants belonging to the order LILIACEÆ, and found on the coast of Western Africa, of Ceylon, and other Eastern islands, as well as of India, remarkable for the strength and fineness of the fibres of their leaves. *Sansevieria zeylanica*, a species found in Ceylon, is remarkable for the tenacity and fineness of the fibres of its leaves. *Sansevieria Roeburghiana* is a native of India. In a good soil, and where the plants are regularly watered, the leaves become 3 or 4 feet long, and contain a number of fine remarkably strong white fibres, which run their whole length. The natives make their best bow-strings of these fibres, which are separated by the leaves being placed upon a flat strong table, when one end is pressed down with the foot, and the rest scraped with a piece of hard wood held in both hands. Forty pounds of leaves thus scraped yield about one pound of clean dry fibres. *Sansevieria lanuginosa*, a third species, found on the sands of Malabar, has been proposed as a substitute for, and even superior to, New Zealand flax.

SAN'SKRIT LANGUAGE AND LITERATURE. See the article INDIA, sections *Aryan Race*, *Aryan Mythology*, *Sutras*, *Language*, and *Secular Literature*.

SANSOVINO, ANDREA CONTUCCI DEL MONTE, an Italian sculptor and architect of eminence, whose works must not be confused with those of his better known pupil Jacopo Tatti, called Di Sansovino, was a pupil of Pollaiuolo, and was much influenced, especially in his later works, by the fine productions of Donatello. Andrea Sansovino's work on La Santa Casa (the Virgin's house at Nazareth, the scene of the annunciation), or rather on the marble casing of it, at Loreto, after its miraculous double transportation from Nazareth to Dalmatia (1291), and from Dalmatia to Italy (1294), is among the most important of the last good work of sculpture before the decay of the art. It consists of figures in niches of prophets and sibyls, with alto-reliefs of scenes from the life of the Virgin, and adventures of the Holy House itself. Andrea worked on them from 1513 till his death in 1528. He was about sixty years old when he died.

SANSOVINO, JACOPO DI, a famous Italian artist, was eminent alike as a sculptor and architect. He was born at Florence in January, 1179, and was the son of Antonio Tatti. He was carefully educated, and at the age of twenty-one was placed with the sculptor Andrea Contucci del Monte Sansovino, and hence was known as Jacopo di Sansovino. He made such progress as in no long time to surpass his master. Contucci, however, so far from feeling jealous of the superior ability of his pupil, rejoiced in his success, and did all he could to assist his progress. Attracted by the promise of his early works, Giuliano da San Gallo took the young sculptor with him to Rome, and gave him apartments in his house. Here Sansovino was employed by Bramante to restore various ancient works for Pope Julius II., and by Raffaele and Perugino to execute models. He also stood high in favour subsequently with Pope Leo X. After the sack of Rome Sansovino repaired to Venice, where his first commission was to restore and strengthen the domes of St. Mark's. The manner in which he completed this task was so satisfactory that he was appointed proto-maestro or chief of the architects. In this capacity he greatly improved the sanitary condition of the city, and effected various public improvements. One of the earliest and most important of the buildings erected by him for the republic was the famous Public Library. The richness of the design and the splendour and beauty of the decorations caused it to be considered at the time as a marvel, and it brought about a notable change in the

manner of building in Venice. Another famous building constructed by Sansovino about the same time was the Zecca, or mint, generally regarded as one of his finest works. Other important public buildings were the Loggia del Campanile; the Fabbriche Nuovo di Rialto; the Scuola and brotherhood of the Misericordia; San Geminiano; San Giorgio de' Greci, &c. Of the palaces built by him in Venice may be named the Cornaro, one of the leading ornaments of the Grand Canal, and one of Sansovino's purest designs; the Delfino, and the Manin. Sansovino lived in great honour at Venice. Along with Titian, he was by a special decree of the senate exempted from the payment of taxes, on account of the glory conferred on Venice by his genius. He was also constantly consulted by foreign princes and distinguished personages. In his youth, says Vasari, he was of a goodly presence; and in his age, whilst with his beautiful white beard he had an extremely venerable appearance, he retained the carriage of his youth. He possessed all his faculties unimpaired till his ninety-second year, when, after a few days' illness, he died peacefully on the 2nd of November, 1570. Sansovino is, after Michelangelo, perhaps the most distinguished of those remarkable Italian artists who, in the first half of the sixteenth century, shone alike as sculptors and architects. In palatial architecture he was the first who fully displayed the capabilities of the style of the classical Renaissance which soon spread over Europe, and has in our own day and country been reproduced with so much acceptance in our club-houses and civic architecture generally.

SANTA ANNA, ANTONIO LOPEZ DE, President of Mexico, was born 21st February, 1798, and first distinguished himself in the Mexican War of Independence under Iturbide, but subsequently took a leading part in his expulsion. In 1828 he was appointed, under President Guerrero, minister of war and commander-in-chief of the army, and in this capacity defeated an expedition sent by Spain to recover the lost colony. In 1833 he was elected president. The state of Texas declared its independence in 1835, and in the war which followed Santa Anna was not only defeated, but taken prisoner, and was not released until 1837. He became president again in 1839, the chief incident in this administration being the French expedition to Vera Cruz, to punish the ill-treatment of some French subjects. In the engagement which ensued Santa Anna lost a leg. He was re-elected to the presidency in 1841, but in 1845 was compelled by a new insurrection to escape to Havana. Recalled in 1846 to the double functions of president and commander-in-chief, he conducted the war against the United States with indifferent success; and by the peace which concluded it the republic was compelled to submit to the loss of Texas and the Oregon territory. Shortly after a military outbreak compelled Santa Anna to flee to Jamaica; but again in 1852 he was recalled to Mexico, and invested with full powers as dictator, which were conferred to him for life, 17th December, 1853. But in the following year an insurrection broke out, in which the clergy, the Indians, and the army united, and in 1855 he took refuge once more in Havana. He subsequently made several attempts to regain power, till in 1868 he sailed from New York, in the neighbourhood of which he had been residing, for Vera Cruz, on an expedition against the native president Juarez, when he was taken prisoner. After trial by court martial he was condemned, but received from Juarez a pardon on condition of quitting Mexico for ever. In 1864 Santa Anna signed an act of adhesion to the empire of Maximilian and was allowed to return to Mexico, but he had no sooner landed than he published a proclamation recounting his former successes, and was therefore expelled at once by General Bazaine, who held the country at the time, waiting for Maximilian's arrival. Again Santa Anna returned to Havana, where he lived till his death in 1876.

SANTA CRUZ (West Indies). See **CROIX, St.**
SANTA CRUZ, or QUEEN CHARLOTTE'S ISLANDS, a group of islets in the South-west Pacific, between the Salomon Isles and the New Hebrides. The chief island is that of Nitendi or Santa Cruz, in 11° S., which has the fine harbour of La Graciosa. Vanikoro, or La Perouse island, on the reef of which the voyager La Perouse perished in 1788, is the most southerly islet of the group. Motuiti, or Kennedy Island, is in the N.E.; the Taumako and Matema islets central between it and Nitendi. The archipelago was discovered by Mendana, whose grave is in Nitendi, in 1595; Carteret, who visited the group in 1767, re-named it Queen Charlotte's Islands. The inhabitants are very savage, and the group was the scene of the murders of Bishop Paterson in 1871, and Commodore Goodenough in 1875.

SANTA FÉ, founded about 1553, and said to be the oldest city of the Union, is the capital of the territory of New Mexico, in the United States. It is situated on the Chiefto River, a tributary of the Rio Bravo del-Norte (from which it is 20 miles distant), at an elevation of 7047 feet. The site is on an arid plain, but water is brought from the hills adjoining, north-east, which rise 5000 feet above the plain, and is conducted through the streets. It has a large caravan trade with Missouri, is on one of the overland routes to California, and is connected by rail with Los Gaynas on the Pacific.

SANTA KLAUS. As already mentioned, in the article **BEEFANA** (the Italian correlative), the time-honoured conception of a pation saint of children, giving them presents secretly at Christmas time, finds its northern representative in *Santa Klaus*. This is the Dutch name for St. Nicholas, a noted child-lover. He is fabled to go round to all the children's beds on Christmas eve after they are asleep, and to put gifts into their stockings (in some places he prefers the shoes), which they find with joy on Christmas morning. If they have been very naughty he puts evil tokens instead, say a twig or two of birch, or the ashes of repentance. It is quite certain, whether the legend be true or not, that the gifts are actually found in the stockings, and are eagerly sought for by the little ones in the early morning of the great festival.

SANTALACEÆ, an order of plants belonging to the Apetalæ. They have round or irregularly-angled branches, alternate or nearly opposite undivided leaves, sometimes minute, and resembling stipules. In the form of woods the genera of Santalaceæ are found in Europe and North America; in Australia, the East Indies, and the South Sea Islands they exist as large shrubs or small trees.

The *Ocotea Nipalensis* belongs to this order, but is a different plant from the *Ocotea* of Pliny, which possessed in former times a reputation for curing every disease. The modern genus possesses no sensible properties as a medicine, and is principally employed for the manufacture of besoms, for which its long slender branches well adapt it. The chief characteristics of this order are the following:—The flowers are generally green and minute; the perianth has four or five lobes; the stamens are as many as the perianth-lobes, and affixed at their base; the disc is epigynous or perigynous; the ovary is generally inferior, it is one-celled, with two or three ovules pendulous from the apex of a free central erect placenta, or sometimes with a single erect ovule; the fruit is indehiscent, generally succaceous; the single seed is destitute of a testa; the endosperm is fleshy and copious; the embryo is straight and has a superior radicle. The species are trees, shrubs, or sometimes herbs, which are occasionally parasitic. There are over 220 species widely scattered over the temperate and tropical regions of the world.

SANTALIN or **SANTALIC ACID**, a peculiar red colouring-matter obtained from red Sandal Wood (*Pterocarpus santalinus*, natural order Leguminosæ). It is a

resinous acid, forming red crystals, insoluble in water, but soluble in alcohol with blood-red colour. The formula is $C_{15}H_{14}O_5$. It forms salts with bases; those of the alkalis are violet when in solution. It is mostly used in India for dyeing silk and cotton.

SANTANDER, the ancient *Portus Blendium*, a town of Spain, on a peninsula in the Bay of Biscay, and the capital of a province of the same name, 316 miles north of Madrid. Its great port is the largest trading place, after Coruña, on the north coast of Spain, and may be called the port of Madrid. It consists partly of narrow streets, with lofty and antiquated houses, and spacious streets, with hand-some modern houses; is defended by several batteries, and has a cathedral, a superior educational institute, a normal and other schools, a town-house, theatre, baths; manufactures of cigars, refined sugar, candles, hats, and varnishes; and a very large export of wool from Castile, and is a port of export for the mining district around. A railway, the highest in Europe, crosses the Cantabrian chain, and connects the port with Madrid. Great difficulties had to be encountered in its construction by the engineer, Mr. Vignolles, an Englishman, owing to the ruggedness of the intervening mountain barrier, and the height at which it could alone be passed, 3053 feet above the sea. The population is about 40,000.

SANTIA GO, the largest and most fertile of the group of the Cape Verde Islands, west coast of Africa, 100 miles west of Cape Verde; length, north to east, 35 miles; width, 15 miles. The highest summit is the central Pico d'Antonia, 7380 feet. On its coast is one of the beds of red coral for which the islands are famous. The chief town is Cidade de Santiago, on the inlet of Porto Praya. Fine specimens of the great tropical tree of Africa, the baobab, appear here with the pear-shaped trunk nearly 40 feet in circumference, though not more than 10 feet high.

SANTIA GO, the capital of the republic of Chili, in South America, is situated near the left bank of the Mapu, on a vast plain extending from the Andes to the Cuesta de Prado, a range of hills near the Pacific, 1840 feet above the sea-level. It is one of the finest cities in America in respect to buildings, convenience, and health, and is often termed by its inhabitants the Paris of South America. It stands on a very gentle slope, at an elevation of 1800 feet above the sea-level, and is regularly laid out in squares. The eight principal streets are crossed by twelve others, all of the width of 45 feet, and are paved with small round stones, with a gutter in the middle, through which a current of water, flowing from the Mapocho, a torrent that skirts the town on the north, is suffered to run during two hours in the day for cleansing purposes. The houses are usually only one story high, on account of the earthquakes, but they are very large, and contain many rooms, arranged round three squares, called *patios*. Their front is occupied by small rooms, which have no communication with the interior, but serve as shops for mechanics and retailers. Travellers have been led down in the main thoroughfares, by which passengers are conveyed night across the city.

The great square, adorned with a handsome bronze fountain in the centre, has on one side the government palace, the prison, and the chamber of justice; opposite stand the cathedral and the bishops' palace; the other two sides are occupied by shops and private residences. The palace is an extensive building in the Moorish style, of which it is a good specimen. The cathedral is the only stone building in Santiago. The other public buildings of the town are in a good style, but they are small, with the exception of the mint, which occupies a whole square and is two storeys high. There are also several handsome churches and convents. The Church of La Compañia was destroyed by fire on 8th December, 1863, during a sacred festival, and upwards of 2000 of the congregation, mostly women, were unhappily burned to death.

At the eastern extremity of the town, on a small rocky eminence, the fort of Santa Lucia stands. Adjacent, on the north, is the Tajamar, or breakwater, a piece of strong mason work, 2 miles long, which protects the town from the inundations of the Mapocho. At its western extremity a handsome bridge of eight arches over the Mapocho leads to the suburb of Chimba. A public walk, called La Canada, planted with magnificent poplars and watered by canals of clear running water, separates the south-western district of the city from the suburb of La Canadilla. The town has a college and a great number of schools.

Course ponchos and saddlery are the chief manufactures. The principal trade is with Valparaiso, with which the town is connected by a railway opened in September, 1863. Its exports consist of gold, silver, copper, jerked beef, hides, and fruits; and its imports of the manufactures of Europe, China, and the East Indies, with sugar, cacao, and some other of the products from Peru and Central America. Two roads, carried over lofty passes of the Andes, connect Santiago with Mendoza on the eastern side of the great chain, and it is connected by rail with VALPARAISO. By these means the city receives mules, hides, soap, tallow, dried fruits, and wine. The population of the city and suburbs in 1880 was 387,081.

SANTIA GO DE COMPOSTELLO, a town of Spain in Galicia, situated on a height, 32 miles south of Coruña. It consists of a walled town and several suburbs, is well built, and has a fine cathedral, a handsome town-house, an episcopal palace, a university, a large suppressed convent, now converted into barracks; superior and elementary schools, and several hospitals, and a celebrated shrine of St. James, the patron saint of Spain. The name of the city (*Campus stellar*, the field of the star) is derived from a legend that the bones of St. Jago (St. James the Elder) were discovered in or near the city, the spot where they lay being indicated by a star, and that they now lie in the cathedral. On this account Santiago was formerly a great place of pilgrimage, but its importance has for many years declined. The population is about 25,000.

SANTIA GO DE CUBA, a town on the south-east coast of the island of Cuba, the capital of the eastern division of the island. It is well built, is an archbishop's see, and has a fine cathedral, and the trade, both with Europe and America, is extensive. Its port, 4 miles long, is well sheltered and deep. A railway unites it with El Cobre, and steamers ply regularly to other ports. The population is about 45,000.

SAN'TIR, a kind of dulcimer, one of the oldest known musical instruments; common, almost unaltered, to this day in Persia, Arabia, and India, as well as in Egypt, though in the latter country it is of Arabian introduction and is not indigenous. The Hindu *santir* is played with a plectrum, but the Persian and Arabian variety is struck with fine curved sticks. A fine specimen from Georgia in the South Kensington Museum may serve as a general type for description. It is a trapezium about 2½ feet wide in front, and the same in depth. It has three sound-holes, twenty-five sets of wire strings, each containing four strings in unison, two rows of bridges which are movable, and therefore permit of delicate adjustments of pitch.

SAN'TONIN or **SANTON'IC ACID**, a substance obtained from the flower heads of various species of *Artemisia* or wormwood, natural order Compositae. It crystallizes in hexagonal prisms, which are insoluble in water, but soluble in alcohol and in oils. The formula is $C_{15}H_{16}O_7$. It melts on heating to 136° C. (226° Fahr.) to a colourless liquid, which crystallizes again on cooling. By prolonged exposure to light it is converted into photosantonin ($C_{11}H_{14}O_5$). When digested with alcohol and metallic oxides it assumes a crimson colour. It is soluble without decomposition in strong sulphuric acid, from which

it is again precipitated on addition of water. It acts as an acid, and forms definite salts with the fixed alkalies and alkaline earths. These salts are crystalline, and mostly soluble. Chlorine forms three derivatives with santonin: monochlorosantonin ($C_{15}H_{17}ClO_3$), dichlorosantonin ($C_{15}H_{15}Cl_2O_3$), and trichlorosantonin ($C_{15}H_{13}Cl_3O_3$); all are colourless crystalline compounds, insoluble in water, but soluble in alcohol and ether. Santonin and sodium santonate ($2C_{15}H_{17}NaO_3 \cdot 9H_2O$) are much employed in medicine as anthelmintics, especially for thread worms in children; 2 to 6 grains of santonin are used, dissolved in castor oil, or in a lozenge, followed by an aperient. Worm lozenges and worm cakes usually contain santonin in some form or other. It colours the urine orange, and in too large a dose it has a singular effect on the vision, causing objects to appear of a green or yellow colour.

SANTORIN, THERA, or KALLISTE, an island of the Grecian Archipelago, 70 miles north of Crete; area, 28 square miles. It is in the shape of a horse-shoe, the convexity of which has a length of 18 miles; and has an inner shore, lined with bold, precipitous, volcanic cliffs, 800 feet high, forming the edge of an ancient crater. From these cliffs the ground slopes east, north, and south, and is covered with vineyards, which produce excellent wines. The rest of the edge of the crater is nearly completed on the west by the islands of Therasia and Aspronisi, which present abrupt fronts towards the gulf embraced by the west shore of Santorin. A limestone and schist mountain in the south, 1887 feet high, originally formed the nucleus of the island; the rest, and the small islands, were formed by volcanic eruptions at a remote era, the entire group being but the remnants of a single volcanic cone. The gulf was formed *v.c.* 236, and since that period volcanic action has been often manifested. The Palæa Kameni, a small crater islet, was thrown up in the gulf about two centuries before the Christian era; the Little Kameni made its appearance in 1573, and a new Kameni in 1707. This last crater, after a long period of repose, broke out in a fearful eruption in 1868, and continued active until 1870. The population is about 5000.

SANTOS, a seaport of South America in Brazil, 31 miles south-east of Sao Paulo, of which it is the port. The entrance of the channel, which leads from the bay to the town, is defended by two forts. The port is formed by the continent and the island of St. Amaro. Sugar and coffee are the chief articles of export, and are brought from the interior on the backs of mules.

SÃO PAULO, a city of Brazil, capital of a province of the same name, is situated between two streams, tributaries to the Tiete, 220 miles W.S.W. of Rio Janeiro. The town has a clean, comfortable, and cheerful appearance. The environs are generally laid out in handsome villas and gardens. The principal edifices are the cathedral, the parish church of St. Iphigenia, several other churches, the governor's and the bishop's palace, town-house, prison, infirmary, the railway stations, and military hospital. The educational establishments include a school of law, an ecclesiastical seminary, a Latin school, school of philosophy, and several primary schools. Sao Paulo, as the capital of the province, is the seat of several important courts of law and public offices, the place where the provincial assembly holds its sittings, the residence of the president, and the see of a bishop. It also possesses three public libraries and an extensive botanic garden. It is one of the oldest cities in Brazil, having been founded in 1554.

SAONE, HAUTE or **UPPER**, a department in France, formed out of the northern portion of Franche-Comté, and named from its position in the upper part of the basin of the Saone, is bounded N. by the department of Vosges, E. by Haut-Rhin, S. by Doubs and Jura, and W. by Côte d'Or and Haute-Marne. Its greatest length, from north-east to south-west, is 70 miles; its greatest

breadth, 38 miles. The area is 2060 square miles, and the population in 1881 was 295,905.

Mountains, Products, &c.—The north-east of the department is occupied by the Vosges Mountains, which rise in the Ballon de Lure and the Ballon de Servance to the respective heights of 4264 and 4100 feet above the sea. Ranges of hills branching from the Vosges run S.S.W. along the right bank of the Ognon; and branches of the Faucilles Mountains, which form part of the watershed between the North Sea and the Mediterranean, cover the north-western districts. The mountainous regions, although covered in many parts with good summer pasture, abound in forests of oak, fir, beech, ash, &c., which supply timber for the marine. It is computed that these woods occupy one-third of the entire area. The high valleys, which are generally traversed by a mountain torrent, here and there forming a cascade, have mostly an arid, stony, and unproductive soil. Minerals, however, are abundant, including red and gray granite, green and violet porphyry, freestone, lithographic stone, grind-stone, gypsum, white sand used in glass factories, limestone, marble, iron, coal, copper, silver, and gold. Several iron and coal mines are worked. The mineral springs of Laxou are the most frequented.

The rest of the department presents a pleasing variety of hill and dale, fertile fields, extensive pasture and meadow lands fertilized by the overflows of the Saone and the Ognon. The hills are covered with woods and vineyards. Corn more than enough for local consumption, vast quantities of cherries for making *Kirschwasser*, various other fruits, maize, barley, rye, some oats, millet, beet-root, pulse, oleaginous seeds, potatoes, hemp, flax, &c., are produced. The wines made are of good quality, but the brandy is stated to be inferior. Horned cattle, horses, goats, pigs, asses, and poultry are bred in considerable numbers; there are but few sheep. Among the wild animals are wolves, bears, foxes, deer, hares, &c. Game and fresh-water fish are abundant.

Hydrography.—The principal river is the Saone, the ancient *Arar*, which rises in the department of Vosges near Daney, and enters Haute-Saone near Jouvette. Hence it runs in a general southern direction, through this department, past Gray; across the south-eastern part of Côte d'Or, passing St. Jean de Losne; it then enters Saone-et-Loire, in which it passes Chalon, and reaches the department of Ain a little below Tournus; from this point to its junction with the Rhone at Lyons its course is nearly due south past Mâcon and Villefranche, between the department of Ain and those of Saone-et-Loire and Rhone. Its whole length is 280 miles—162 of which, from Gray to Lyons, are navigable. Steamers ply between Lyons and Chalon. The Saone is joined on the right bank by the Canal de Bourgogne and the Canal du Centre—the former affording communication with the Yonne and the Seine, and the latter with the Loire. From the left bank the Canal du Rhone au Rhin connects it with those rivers. The fall of the Saone is very gradual, and it overflows its banks periodically, though the floods are not disastrous, but highly beneficial to the low pasture and meadow land that fringes its banks. Its principal feeders in this department are—on the right, the Arnance and the Saulon; on the left, the Coney, the Lanterne, the Dugeon, and the Ognon, which last for a long way divides Haute Saone from Doubs and Jura.

Industrial Resources.—The chief industrial product of the department is iron in the various forms of pig-iron, and sheet, tin plates, steel wire, or articles of commonery. The other industrial establishments include chain and glass works, potteries and brickfields, distilleries, tan-yards, cotton and paper mills, dye-houses, several oil mills, &c. Straw and felt hats, hosiery, drugget, and hempen cloth are also made; and there is a good trade in corn, flour,

lay, timber, oak staves, deals, butter, cheese, salt, and cattle.

The surface of the department measures about 1,300,000 acres, and it is divided into the three arrondissements of Vesoul, Gray, and Lure. The chief town is VESOUL.

SAONE-ET-LOIRE, a department in France, formed out of a portion of Bourgogne, and named from the two rivers that drain it, is bounded N. by Côte d'Or, E. by the departments of Jura and Ain, S. by those of Rhone and Loire, and W. by those of Allier and Nièvre. Its greatest length from north to south is 68 miles, from east to west 85 miles. The area is 3300 square miles, and the population in 1881 was 625,589.

General Aspect.—The department is traversed from north to south by the Cévennes Mountains, which here form the watershed between the Atlantic and the Mediterranean. In the south these mountains consist of several parallel chains separated by longitudinal valleys, and reach the height of about 3000 feet above the sea; but they diminish rapidly in height and also in breadth in their advance northwards, and terminate in the valley of the river Dheune, which divides the Cévennes from the mountains of Côte d'Or.

Hydrographical Systems, Soil, &c.—From the Cévennes numerous offshoots branch eastwards, dipping into the valley of the Saone at some distance from the river, except in the arrondissement of Mâcon, where, between the Grône and the Saone, the hills here and there extend to the right bank of the latter. The Saone crosses the north-east of the department, receiving the Doubs and the Saône on the left and the Dheune and the Grône on the right bank; it then runs south along the eastern boundary, receiving in this part of its course no tributary of importance. Indeed the Grône, which rises near Beaune in the department of Rhone, runs for almost its whole length through a narrow valley between wooded hills in a northern direction, parallel to and about 12 miles west of the Saone, and receives most of the mountain streams in this portion of the department. The arrondissement of Louhans, watered by the Saône, and a great part of the arrondissement of Chalon are level, and produce a great deal of corn and hay. Along the Doubs (the frequent floods in which are prevented by dykes from overflowing the plains) and the Saone there is a great deal of excellent pasture and meadow land. The arrondissement of Mâcon is hilly, and more than two-thirds of its surface are under vines. The best wines made in the department are those of Maconnais and Chabonnais, which are much valued.

The western division of Saone-et-Loire consists chiefly of the basin of the Arroux, it extends between the Cévennes and the Morvan Hills, which last spring from the mountains of Côte d'Or. The Arroux is navigable only from the bridge of Toulon to its entrance into the Loire near Digoin; it is available for floatage, however, from Autun. The Loire crosses the south-western angle of the department, and then forms the boundary between Saone-et-Loire and Allier. The southern part of this division forms the arrondissement of Charolles, which includes the western slopes of the Cévennes, and contains abundant pasture and some good corn land; but the arrondissement of Autun and the basin of the Arroux generally has a poor soil, which yields little else than grass, rye, and potatoes. In the north-west of the department, however on the slopes of the Morvan Hills, there are some fertile lands, and many most picturesque dells opening among wooded hills whence the clear feeders of the Arroux descend; in this district also there is a fine breed of cream-coloured oxen, and the fields are generally enclosed by hedges.

Products.—Though the surface of the basin of the Arroux has in general an ungrateful soil, it covers one of the richest coal-fields in the country. In the neighbour-

hood of the coal mines are numerous ironworks, the ore used in which is partly obtained on the spot, but most of it is the produce of distant mines. At Creuzot, where iron and coal are raised, is one of the most important ironworks in the country, and great foundries in which cannons, anchors, steam machinery, mill castings, &c., are manufactured. Near Romanèche, in the arrondissement of Mâcon, is the richest manganese mine in France. There are some celebrated mineral springs at Bourbon-Lancy.

There are large forests of oak, elm, beech, and fir in the Morvan and Cévennes ranges, and in several other districts; in the eastern division of the department the forests contain also maple and poplar. The bare sandy flats that formerly occurred at intervals along the banks of the Saone are now clothed with pine plantations: and altogether about one-fifth of the area is covered with woods. Besides wine the agricultural products include wheat, rye, maize, some oats, potatoes, and hemp. Horned cattle are numerous; in the pastures of the Charollais large numbers are fattened for the Paris market: oxen are used in the plough. Horses are small in size; sheep and swine are reared in considerable numbers. Wolves, foxes, and wild bears are met with in the Cévennes. Game and fresh-water fish are abundant.

Manufactures and Communications.—To the industrial products already mentioned are to be added steel and steel ware, glass bottles, copper ware, paper, beet-root sugar, pottery, bricks, cotton cloth and yarn, linen, leather, felt hats, druggist, plaids, wine casks, oil, flour, &c.

The district is traversed in its whole length by the Paris-Avignon Railway, which runs from Chalon to Lyons, at a little distance from the right bank of the Saone, and through Mâcon. The Canal-du-Centre, which leaves the Loire by the Arroux at Digoin, is carried by locks over the Cévennes (from lakes on the very crest of which it receives a supply of water) into the valley of the Dheune, and ultimately joins the Saone at Chalon. It affords an outlet for the coal, iron, and other products of the department into the Loire and the Rhone: while a railway from Epinac to the Canal-de-Bourgogne opens a ready communication with the Seine. The total length of navigation afforded by the Saone, the Loire, their feeders, and the canal before mentioned amounts to about 270 miles.

The department contains 2,116,165 acres, and is divided into the five arrondissements of Mâcon, Autun, Charolles, Chalon, and Louhans. The chief town is Mâcon.

SAP, in vegetable physiology, is the fluid imbibed by plants from the soil in which they are placed, and is the great source from which they are nourished and their various peculiar secretions produced. One of the most important conditions of their growth is, that they be placed in circumstances to absorb from the soil those constituents of which their sap is composed. The constituents of sap may be divided into those which are essential, or necessary for the growth of all plants, and those which are special, or necessary for the growth of particular plants or families of plants. The elementary bodies which form the essential constituents of sap are carbon, oxygen, hydrogen, and nitrogen. These bodies are capable of uniting with each other, and forming a great number of secondary combinations, and are seldom, if ever, absorbed in a pure state. The forms in which they enter the plant are those of carbonic acid, water, and ammonia; and they are mostly derived from the soil and the atmosphere. The latter appears to be the great source of the carbonic acid, while the soil appears to supply the greatest quantity of water.

The metallic oxides enter very largely into the composition of some plants. The most common are the oxides of potassium, sodium, calcium, and magnesium. These occur in combination with various acids, but the acid is not found to exercise so much influence on the plant as the base. Although any of these oxides when presented in solution

would be absorbed by plants, only those adapted to the peculiar habit of the plant would be appropriated. Thus, plants which grow naturally on the sea-shore, and require soda for their growth, will take up potassa when presented to them in combination with soda, but reject the potassa by excretion and retain the soda. The sap, therefore, varies in composition both from the nature of the soil and the nature of the plant.

From the soil the sap is conveyed by the roots into the plant, and is not long before it undergoes certain changes in its composition; but the nature of these changes, and the period at which they take place, require further investigation. It is, however, a fact, that the nearer a tree is tapped to its root the more fluid is the sap which exudes. The channels through which it passes in its upward course are also a subject of difficulty. However, we find that it undergoes great changes between the period of its absorption from the soil and its ultimate disposition in the secretions of the plant. The most important of these is the loss of a large portion of that water which it possessed when first absorbed, by the process of exhalation, which takes place in the leaves. In this way it has been ascertained that a common sunflower, 3 feet in height, will lose 1 lb. 4 oz. of water every day, and a common cabbage 1 lb. 8 oz. Hales contrived to measure the force with which plants exhaled during the summer, and computed that in some instances it was five times as great as that which impels the blood in the crural artery of the horse. While the sap is in the leaf an important change takes place. It consists principally in the decomposition of carbonic acid, the giving out its oxygen into the air, and the combination of the carbon with other elements to form the various secretions of the plant, such as gum, sugar, starch, lignine, &c. In this way plants perform a very important function in the economy of creation. The carbonic acid, which, accumulating in the atmosphere, would become injurious to animal life, is removed; and not only is the noxious ingredient removed, but it is decomposed, and the pure oxygen which it contains, and which is as essential to animal life as carbonic acid is injurious, is given out.

From the period that the sap is absorbed by the roots to the time that the various secretions of the plants are elaborated, it is in a state of constant activity. The general motions are those of ascent and descent, both of which may be rendered apparent by cutting through the trunk of a tree, when not only the cut surface below will present an exudation of juice in its ascending course, but the cut surface above will present fluid that is descending. The ascending current seems to depend on the exhalation from the leaves, while the descending current is due to gravitation. The agency of light is necessary to the performance of these functions. For other causes of the movement, see OSMOSIS.

SAP, in military engineering, is the name given to the mode of approaching a fortress by narrow trenches, leading from the most advanced parallel towards the place besieged. In cutting these trenches the men are protected by means of iron shields where they are available, or more commonly by gabions and wattled rollers. The work of sapping is always attended with great danger, as the sappers work within small-arms range, and in consequence the operations are as far as possible conducted during the night.

SAPAJOU, a French corruption, used by Buffon, of the native name (*Cuigonazon*) of certain South American monkeys of the genus *Cebus*, now usually called *CACREUS*.

SAPAN or **SAPPAN WOOD**, a dyewood yielded by *Cesalpinia Sappan*, which grows in India and the Malay Archipelago. It has been used to dye red from very early times in India, and is described as a medicine in Persian works. It found its way into Europe some time before the discovery of America, and still continues to be imported. Its colouring matter differs little from that of Brazil wood, but the best Sapan wood does not yield more

than half the quantity that may be obtained from an equal weight of Brazil wood, and the colour is not so bright. Sapan-wood extract, fused with sodic hydrate, produces Sappanin, a neutral crystalline substance soluble in alcohol, ether, or boiling water, but almost insoluble in cold water. See *C. SAPPANIN*.

SAPAN^{RED} or BRAZILIN, the colouring matter of Sapan Wood (*Cesalpinia Sappan*, natural order Leguminosae). It is soluble in alcohol, from which it crystallizes in yellow needles, having the formula $C_{22}H_{20}O_7$. It is also soluble in water and ether. The solutions are coloured deep carmine red by the alkalis.

SAPINDACEÆ, an order of plants belonging to the POLYPERALIA, containing between 600 and 700 species. These are trees or shrubs and a few herbaceous plants, inhabiting South America, India, and the tropics generally. They possess erect or sometimes climbing stems, with alternate, often compound leaves, rarely simple, with or without stipules, and often marked with lines or pellucid dots. *Dodonaea* is found in Australia.

In this order, although the leaves, branches, and other organs act in a deleterious manner, the fruit and seeds are eatable and wholesome. The LITCHI, LONGAN, and rambutan, favourite fruits in China, belong to the genus *Nephelium*. They are sweet, with a subacid flavour, and when dried are sometimes brought to this country. Several other genera bear very delicious fruits, and are eaten in Japan and Brazil. The *Sapindus* is remarkable for bearing a pulpy fruit, the outer part of which has been used, on account of its detergent properties, as a soap. [See *SAPINDUS*.] *Paulina* is a genus which has poisonous properties residing in its leaves and other parts, while its fruits are eatable. The whole of the order partakes more or less of these properties. See *SAPINDITIA*.

The characteristics of the order are the following:—The flowers are mostly small, inconspicuous, and without smell; the sepals are four or five in number; the petals are wanting, or three to five; the disc is sometimes unilateral, the stamens are generally double the number of the petals, or, if the same number, alternate with them; the ovary is entire or lobed, generally three-celled, with a single style; the ovules are one or two in each cell, attached to the axis, ascending, with ventral raphe and inferior micropyle; the fruit is capsular or indehiscent.

SAPINDUS, contracted from *Sapo Indicus*, or Indian soap, and applied to a genus of plants of the order *SAPINDACEÆ*, which has been so called in consequence of the berries of many of the species being employed for the same purposes as soap. The genus is tropical, containing between twenty and thirty species, which are found in the tropical parts both of the Old and New World. The berries are red and saponaceous, on which account they have been employed for washing woollens and cloths of various kinds in different countries. For instance, in the West Indies and the continent of America, *Sapindus Saponaria* yields the so-called soap-berries. In the East Indies several species, as *Sapindus laurifolius* and *emarginatus*, yield berries which in their dried state may be bought in every bazaar, and are everywhere employed as a substitute for soap. The fleshy part of these berries is viscid, and in drying assumes a shining semitransparent appearance. When rubbed with water they form a lather, owing to the presence of a principle called by chemists *Sapona*, but this is often united with an acid principle, whence these berries are said to injure cloth which has been much washed with them. The bark and root have similar properties, and have been employed for the same purpose, as well as medicinally, in the countries where they are indigenous. The berries, about the size of cherries, inclose black shining nuts, used for making necklaces, rosaries, &c. The kernel contains an edible oil, sometimes employed for burning. The fruits of *Sapindus sengkalisensis* are eaten,

and the wood of some species, as of *Sapindus rubiginosus*, is close-grained and hard, and forms valuable timber.

SAPODILLA PLUM, the name given in the West Indies to the fruit of several species of *Achras*, a genus of the order SAPOTACEÆ. The pulp of the fruit is sweet, and used for dessert; the seeds are aperient, diuretic, and gangrenous in large quantities.

SAP'ONIN or **SEN'EGIN**, a substance first obtained from the soapwort, *Saponaria officinalis*, natural order Caryophyllaceæ, but also found in quillala bark, in senega root, in the horse-chestnut, and many other plants. It is a white aromatic powder, which excites violent sneezing. The formula is $C_{12}H_{22}O_7$. It is soluble in water, forming a persistent frothy or foaming solution, but insoluble in alcohol and ether. It is decomposed by dilute mineral acids into a carbohydrate and saponenin ($C_{12}H_{21}O_6$).

SAPOTA CÆ, an order of plants belonging to the MONOCOTYLEDONÆ. The plants of this family are chiefly natives of India, Africa, and America. Some of the species produce fruits which are much prized as articles of diet. Among these is the **SAPODILLA PLUM**. The Star Apple (*Chrysophyllum Cainito*), Mammalade (*Locuma mammosa*), the Medlar of Surinam (*Mimusops Elæagn*), and other eatable fruits, are derived from plants belonging to this order. Most of the species yield large quantities of a milky juice, which, unlike the sections of most lacteoseut families of plants, may be used for alimentary purposes. The fruit and seeds abound in oil, which becomes solid like butter, and has a mild pleasant flavour. [See BASSIA.] **GUTTA-PERCHA** is obtained from *Dicopsalis gutta*. The bark of some species of *Achras* is astringent and tonic, and has been recommended as a substitute for quinine.

This order differs from its allies in the following respects—the stamens are of the same number as the corolla lobes, opp. site to them, and attached to the tube together with staminalides; the ovary is superior, divided into several cells with one erect anatropous ovule in each; the style is single, with an undivided stigma; the fruit is a berry or drupe; the seeds are large, and usually with perisperm. The species are trees or shrubs, usually with a milky juice, and alternate, simple leaves.

SAPPERS AND MINERS, ROYAL, the name formerly given to the non-commissioned officers and privates of the corps of Royal Engineers. See **ENGINEERS, MILITARY**.

SAPPHIRE, a precious stone of a blue colour, belonging to the corundum group of gems. It possesses the common characters already referred to under **CORUNDUM** and **RUBY**, and merely differs from the latter in coloration. It is likewise found in alluvial deposits in the East Indies, associated with rubies, but appears to be extremely rare. An opalescent variety has a pearly lustre, and Astoria or star-stone produces a singularly beautiful star-like reflection. Other varieties are the yellowish Oriental topaz and the green Oriental emerald, these being true sapphires of unusual colour and quite distinct from the gems with which the common names suggest relationship.

SAPP'HO (Gr. *Sappho*, using *f* for the Greek *ph*; but in the Pæonia dialect called *Pappo*), the famous poetess, was born in Lesbos about 630 B.C. According to the general account she was a native of Mitylène. Very little is known of her life, and the incidents related by the ancient writers are mostly of a fabulous nature. According to the legend she was attached to a beautiful youth named Phaon. This youth had once been an ill-favoured old boatman of Mitylène, and had earned the favour of the goddess Aphrodité by his cheerful and voluntary service in ferrying her over sea in one of her adventures. As a reward she gave him youth and beauty. Phaon had long adored the beautiful poetess Sapphó; but now it was his turn to slight her, and he used his power so unmercifully that, unable to bear longer with life at such a price, she sprang from the Leukæan rock into the sea. Perhaps it ought to be added

that no allusion to Phaon is found in the Sapphic fragments nor in contemporary writers; and that the legend is explained as an allusion to a form of sacrifice. It is certainly of later invention, and quite baseless. Sappho was in terms of friendship with her countryman Alkaios (Aleus), and shares with him the chief distinction in Eolian lyric poetry. She established a school of poetry in Lesbos, and many ladies among her pupils obtained great literary distinction, though none of them at all approached Sappho in genius. Her death occurred about 570 B.C. As to the artistic merit of her compositions there can be but one opinion. Aristotle ranked her with Homer and Archilochos. Plato styled her the tenth muse. But her moral character has been the subject of much dispute among modern scholars. It seems probable that her faults may have been exaggerated by the Athenian comic dramatists, with whom she was a favourite subject for satire; but a careful examination of the extant fragments of her compositions quite supports the view that the poems of Sappho were over-free in expression, though ranking in the very highest order of literary excellence. Her works comprised hymns and elegies, but seem to have mainly consisted of amatory lyrics. From her frequent use of what is termed the Sapphic-metre, it was called after her name. Her poems filled nine volumes, but now very little remains. The largest fragment is a hymn to Aphrodité, and is perhaps almost or quite perfect. It is a very beautiful poem. Up till lately the best edition of Sappho was that by Neue (Berlin, 1827); but in 1885 Mr. Wharton collected every line and word yet remaining to us of the "pansy-weaving, pure, sweet-faced Sappho" (her friend Alkaios' description of her) preserved in quotations and criticisms through twenty-five centuries, and added an excellently exact prose English translation, also a large selection of the numerous translations in verse of the best known pieces.

Sapphics.—The exquisitely varied play of the Sapphic line, typically composed of a trochee, spondee, dactyl, and two trochees, can hardly be perfectly represented in English, where accent and not quantity is the guide of the verse. It was a great favourite with Horace; the famous "Integer vitæ" being a choice and familiar specimen. Three long lines of Sapphics are followed by an *adonic* (a dactyl succeeded by a spondee). Far and away the best English sapphics have been written by Swinburne, and the following fragments of his work may serve as a specimen of this most charming metre, as nearly perfect as our language allows:—

"Songs that move the heart of the shaken heaven,
Songs that break the heart of the earth with pain,
Hearing, to hear them."

SAPUCAIA NUT, the seed of *Leceythis Zapuczo*, a tall tree which flourishes in the virgin forests of Brazil. The fruit is shaped like an urn, is as large as a child's head, and opens by a lid which falls off when ripe. Each fruit incloses several seeds or *nuts*, whose flavour is very agreeable, and whose form is that of an oval slightly pointed at both ends. Monkeys feed upon the nut, and are sometimes caught by it as in a trap; for after thrusting their hand into the open shell they are unable to withdraw it when filled, and yet they will not part with the prize. The nuts are sometimes imported into England from Para, but notwithstanding their superiority to the common Brazil nut, do not command a ready sale. See **LECEYTHIS**.

SAPYGIDÆ is a family of hymenopterous insects of the section Fossoræ, the species of which are chiefly distinguished by the feet, in both sexes, being slender and destitute of spines; the antennæ are at least as long as the head and thorax together, and generally increase in thickness towards the extremity. It contains only one genus, *Sapyga*, the species of which occur in Europe and North America. The common English species, *Sapyga punctata*, is found in the nest of bees of the genus *Osmia*,

but it is not known whether it is strictly parasitic. It is about half an inch in length, black, with the abdomen spotted with white in both sexes, and partly red in the female. A larger species, *Sapyga repanda*, found on the Continent, is found in the nests of the Carpenter Bee (*Xylocopa*).

SAR'ABAND (Spanish *zarabanda*; Ital. *sarabanda*), in music, a composition in triple time (three minims to a bar), of a more slow and stately character than a minuet. The accent is placed on the second minim of each bar which is dotted. It takes its name from a slow Moorish dance, once popular in Spain and among the courtiers and ladies of our Tudor and Stuart sovereigns, but is now restricted to a musical composition. The finest familiar example of a saraband is Handel's superb air "Lascia ch'io pianga," which occurs as a song in "Rinaldo," but is almost more for note taken from an instrumental saraband in his earlier opera "Almira."

SAR'ACENS, a term much used to represent the Arab races generally [see ARABIA], Moors being used to represent the Spanish conquerors, and Arabs often being confined to the Bedouin and other nomadic tribes.

In mediæval times the term was very loosely used, the Seljuk and Ottoman Turks even being included in its range. Its present signification returns accurately to the original meaning; the word being merely the Arab *sharkeyn*, "orientals," which the Greeks applied to the Arabs of Mesopotamia and Arabia, on the eastern frontiers of the empire; and the Greek *Sarakēnoi* became the Latin *Saraceni* by the usual course of development between those languages. The Arabs of the East called themselves *sharkeyn* ("orientals") in contradistinction with those of the West, the *Maghreb* ("occidentals"), our words Morocco and Moors coming from the latter term.

SARAGOS'SA, properly *Zaragoza*, the ancient *Cæsarea Augusta*, the capital of Aragon in Spain, is situated on a fertile plain near the canal of Aragon, and on the banks of the Ebro, which is here crossed by a fine stone bridge of seven arches. Saragossa is 175 miles north-east from Madrid, is connected by railways with Barcelona and Pamplona, and has about 85,000 inhabitants. The city has many remarkable buildings. The Exchange is a fine stone edifice. Nearly opposite to it is La Casa de la Diputación, a noble building erected by Alfonso V. It serves for the sittings of the Audiencia, or supreme court of justice. The palace of Aljaferia, formerly the residence of the kings of Aragon, is a fine square building with towers at the angles. The orphan asylum, built by Ferdinand V., the last king, is much admired for its solidity and beautiful proportions. The metropolitan church, called La Seu, is distinguished by its elaborate front and high tower. The Cathedral of Nuestra Señora del Pilar is celebrated all over Spain for its sanctuary, which attracts numerous pilgrims to see a pillar on to which the Virgin is supposed to have descended from heaven. There are several large and well-conducted hospitals. A singular edifice is the leaning tower, which has remained in its present inclined position since 1694, the year in which it was built. The city has eight gates, besides the four old ones in the wall of Augustus, part of which may still be traced. There is a university, founded in the year 1474; and among the other educational establishments are—an episcopal seminary, an academy of the fine arts, economical society, and public library. The manufacture of silks, woollens, and leather has greatly declined; but the city has still a considerable trade in agricultural produce by the Ebro. Saragossa gives title to an archbishop, and is the residence of the captain-general of Aragon.

The city is very ancient, and numerous vestiges of Roman remains attest its former importance. Its first name, according to Pliny, was *Saludba*, but the Emperor Augustus gave it the name of *Cæsarea Augusta*, of which

Saragossa is a corruption. It was taken by the Moors in 712. In 1118 Alfonso I. of Aragon recovered the city after a siege of eight months; and a victory at Albacete in 1145 restored the whole of Aragon to the Christians. From that year till the accession of Charles V. it remained the capital of the kingdom of Aragon, as it has since been of the province of Aragon. It is famous for two sieges which it sustained during the Peninsular War in May and November, 1808. In the first the French led to raise the siege, after the loss of several thousand men. In the second a young girl, since styled the Maid of Saragossa, distinguished herself by her steady courage and intrepidity. At last an epidemic fever, which broke out among the besieged, compelled a surrender in January, 1809. The injuries sustained by the city during these sieges remain to a great extent unrepaired.

SARASWA'TI, in the Hindu mythology, is the wife of Brahma, her chief attributes being music, poetry, oratory, and painting. To her were traditionally ascribed the invention of letters and the Sanskrit language, granted to mankind by her as a reward for the merits of the ascetic sage Bharata.

SARATO'GA SPRINGS, a fashionable watering-place in the state of New York, North America, about 38 miles north of Albany. It contains twenty-eight mineral wells, some iodine and some chalybeate, which have been found useful in dyspepsia and diseases of the liver. There are numerous immense hotels, and in the season it is crowded with all the wealth and fashion of the northern states. There are also a handsome town-hall, numerous churches, and a fine park. On Saratoga Lake the American University boat races are rowed. The population in 1880 was 10,822. Near this place General Burgoyne and the British army capitulated to the United States forces under General Gates, 15th October, 1777. This event was speedily followed by the recognition of the independence of the United States by France, Spain, and Holland.

SARATOV', a town of Russia, in the government of the same name, situated on the right bank of the Volga, 219 miles E.S.E. of Tambov by rail, in an arid and barren valley, between the river and a range of pretty high calcareous mountains. The city, which is neither handsome nor regular, is divided into the upper and lower towns. It was built on its present site in 1665, and, the greater part being of wood, has been frequently damaged by fire. There are seven stone and several wooden churches (including Lutheran, Roman Catholic, and Greek United), two convents, some monasteries, a mosque, botanic garden, and a very large market-place or bazaar. The other public edifices are—the archbishop's palace, the government buildings, several hospitals, an ecclesiastical seminary, college, and other schools. The population of the city is 93,000, many of whom are employed in manufacturing cotton cloths, cotton and silk hosiery, clocks, watches, leather, tobacco, rope, and earthenware; there are also a bell foundry, breweries, distilleries, and vinegar factories. From its position on the Volga, between Astrakhan, Moscow, and Nijni Novgorod, Saratov has an extensive trade, importing colonial goods and exporting corn.

SAR'AWAK, a native kingdom of Borneo, on the west coast, along the southern shores of the Bight of Bata. It has a coast line of about 330 miles, an area of from 34,000 to 40,000 square miles, and a population of about 250,000. There are some lofty mountain ranges and extensive forests, while the interior is accessible by numerous streams. The country is very prosperous, slavery is to be abolished in 1888, education is spreading and is carefully attended to, and the climate is not unhealthy. The exports and imports amount to about £1,000,000 per annum. The great difficulty is want of labour, but this may be remedied by the immigration of Chinese, who, as long as they are prevented from forming secret societies, make

valuable citizens. The soil is productive and well suited for sugar, cloves, cinnamon, pepper, gambier, and rice; it is well covered with the cocoa-nut palm, and yields valuable iron-wood, ebony, sandal-wood, and teak in abundance; and is rich in minerals, particularly gold, antimony, nickel, coal, diamonds, and other precious stones. This territory is of interest as having been governed for twenty years, from 1841 onward, by Sir James Brooke, who ruled it as rajah, and has been succeeded by his nephew; these have done much to civilize the country and increase its prosperity, and to abolish piracy in the neighbouring seas. Its inhabitants are aboriginal Dyaks in numerous tribes, with Malays and Chinese on the coast.

SAR CINE, a basic substance found in flesh. It is a white crystalline powder, soluble in boiling water, with the formula $C_4H_4N_4O$. It forms definite crystalline salts with acids; the hydrochlorate has the formula $C_4H_4N_4O \cdot HCl \cdot H_2O$; the chloroplatinate, $2(C_4H_4N_4O \cdot HCl)PtCl_4$, is a yellow crystalline precipitate. Sarcine is present in flesh in minute quantity, 100,000 parts of beef yielding only 22 parts. It is found in the mother liquor from the preparation of creatine.

SAR CODE, the name given to the germinal matter of animal life by Dujardin, its discoverer. Sarcocoe is not distinguishable from PROTORRHOISM, the germinal matter of vegetable life, discovered and named by Muller. The latter term is now used to cover the two forms of the physical basis of life.

SARCOLEM MA, the external fine transparent structureless membrane, in the form of a tubular investing sheath, forming the outer wall of a muscular fibre, and containing the contractile material of which the fibre is made up. Sometimes by its superior toughness the sarcolemma may remain unbroken, and its existence thereby made very manifest, when by extension the contained part can be broken.

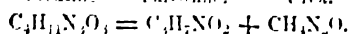
SARCO MA, in medicine, was the name formerly given by medical writers to all tumours of a fleshy or moderately firm tissue. It fell into disuse for a considerable time, but it has again been revived to designate those tumours which are composed of some modification of embryonic connective tissue. See TUMOUR.

SARCOPH AGUS (Gr. *sarkophagus*, from *sarx*, and *phagō*, to eat), in antiquities, a stone receptacle for a dead body. The name originated in the supposed property of the *lapis Assos* (stone of Assos, in Asia Minor) to consume dead bodies by corrosion in the space of forty days. The most ancient sarcophagi now known are those of Egypt, and these are generally of an oblong form, plain or carved with the lotus, or shaped like a mummy, and covered with hieroglyphics. Sarcophagi were also used by the Persians, Phœnicians, and Romans. Stone coffins were in vogue in the mediæval days in many European countries, and are not even now entirely obsolete. Some remarkable sarcophagi, of great value to the students of ancient history, have been brought from Egypt to England, and are now preserved in the British Museum.

SARCOP TES. See LICH-NITE.

SAR COSINE or **METHYL-GLYCOCINE**, a base obtained, together with urea, by the action of baryta on creatine from flesh. The formula is $C_3H_7NO_2$.

Creatine Sarcosine. Urea.



It is obtained in large colourless crystals, very soluble in water, slightly soluble in alcohol, insoluble in ether. It forms definite crystalline salts with acids. The sulphate has the formula $2C_3H_7NO_2 \cdot H_2SO_4$. The platinum salt, $2(C_3H_7NO_2 \cdot HCl)PtCl_2 \cdot 2H_2O$, is obtained in large yellow octahedral crystals. It also forms a double salt with mercuric chloride, crystallizing in needles. It colours a solution of cupric acetate dark blue, acting the same as ammonia.

SARD, a valuable variety of CORNELIAN, so called from Sardis, whence the gem is supposed to have been first obtained by the ancient Greeks.

SARDANAPA LUS, the last King of Assyria, has become proverbial as a type of voluptuous indolence. The familiar legend runs thus:—Arbaces, satrap of Media, relying on the weakness of the king's character, resolved to throw off his allegiance. A conspiracy was formed, and Arbaces, supported by Belesys, a Babylonian priest, marched at the head of an army against Sardanapalus, who, getting together his army, went forth and defeated the rebels twice or thrice, but was afterwards obliged to shut himself up in Nineveh. Here he sustained a siege for two years, though deserted by all the provinces. When he found further resistance hopeless he caused a pyre to be raised, on which he burnt himself, his wives, his concubines, and his treasures, *v.c.* 625.

The character of Sardanapalus alone suffices to throw discredit on the narrative. A man sunk in effeminacy for years would scarcely be transformed all at once into a valiant warrior leading his hosts to battle, sustaining a two years' siege against veteran hosts, and committing an act of frantic heroism at last. The fact is that the legend-makers confused the great Assurbanipal, who reigned from 667 to 625, with his unfortunate son Sardanac, who perished somewhat in the way described above, in the revolution which, at his father's death, set the Babylonian Nabopalassar on the throne of the united Assyria and Babylonia. These monarchs the Greeks called respectively Sardanapalos and Sardanapalos II. [See BABYLONIA.] Byron's famous play follows of course the poetical legend, not the historical fact.

SAR DES or **SAR DIS**, now *Sart*, a city of Asia Minor, formerly the capital of Lydia, was placed in a rich and open plain, between Mount Tmolus and the river Hermus, and on the banks of the river Pactolus. It flourished greatly under the rule of Cræsus, the last of the Lydian sovereigns; was afterwards the residence of the Persian satraps or lieutenants; was burned by the Greeks in *b.c.* 503; and finally fell into the hands of the Romans. It is one of the seven churches named in the Apocalypse. Its ruins are considerable. The most remarkable feature is the Acropolis, one part of which was so steep that in the time of Cræsus, when the rest of it was fortified, this was considered secure against an enemy without being artificially strengthened. It was on this side, however, that the place was taken by the Persians under Cyrus (*Herod.* i. 84). The ruin of the Acropolis is continually crumbling, and presents a very rugged and fantastic outline. There are also the remains of a large and magnificent temple, the western front of which is on the Pactolus, and the eastern under the steep rock of the Acropolis. Traces of a theatre and of a stadium have been found under the north side of the Acropolis. *Sart* is now a miserable place, consisting of a few mud huts.

SAR DINE, a fish of the herring family (*CLUPEIDÆ*), not specifically distinct from the PILCHARD (*Clupea pilchardus*) of Cornwall. It abounds in the Mediterranean, and is also found in the warmer regions of the Atlantic. It closely resembles the pilchard, but is of a smaller size. It is much esteemed on account of its delicate flavour, and, preserved in oil, is largely imported from the Mediterranean ports. The sardines from the west coast of France, however, are not true sardines, but young sprats, of the same kind as the garvie found in the shallows of the Frith of Forth, between North and South Queensferry, on the western side of Inchgarvie. Young herrings are sometimes cured and sold as sardines.

Just as herrings and sprats appear in shoals at particular seasons on the coasts of Britain, so do sardines on the shores of the Mediterranean. On the coast of Provence the fishery is pursued in the months of May, June, and

July; but the fishing for the sprats caught on the west of France, and cured and sold as sardines, takes place in the winter months. The quantity of both kinds exported is so great as to amount in value to 4,000,000 francs annually, or about £160,000 sterling. In the south of France sprats or sardines are frequently cured in red wine, and sold under the name of *sardines anchoiâtes*.

The process of preserving sardines in oil is as follows:—The fish are carefully washed in the sea, and then carried to the curing-place, where they are slightly sprinkled with pure fine white salt; after remaining thus a few hours, women are employed to take off the head, which brings away the gills, &c.; and after again well washing they are laid out either on willow branches or wire-work, and exposed to the sun and wind, or to a current of air if under cover, if the weather is damp or rainy. This drying gives clearness and pureness to the skin. They are then put into boiling oil; and after being the requisite time in this oil, they are drained as much as possible, and then put into tin boxes. When the boxes are filled they are carried to tables prepared for the purpose, and the fish covered with oil; the tinsmith next soldering on the cover. The boxes are then placed in the boiler, or exposed to hot steam, to undergo the process of ebullition for such time as the curer considers necessary. After being taken out the boxes are examined, and those rejected which have leaked or have not resisted the pressure of boiling. Generally speaking, all the boxes that are not convex on the two sides, when taken out of the heating process, are bad; but the reverse is the case if the swelling in convexity continues after the boxes have become cold.

The heads and refuse are much valued for agricultural purposes. There are about forty French establishments which prepare the sardines with oil in tin boxes, and the quantity prepared is about 10,000,000 boxes annually.

An ingenious Frenchman has patented a process for preparing boneless sardines. Its details are kept secret, though they can hardly prove an unfathomable mystery to persons skilful in dressing and cooking fish. But as the extraction of the bones must make the curing a slower and more laborious operation, the boneless sardines must necessarily be somewhat more expensive. Sprats and young herrings, as well as the Cornish pilchard, are preserved in oil in the same way.

SARDINIA, a large island in the Mediterranean. Its form is nearly a parallelogram, 140 miles in length, with an average breadth of 60 miles. The area is 9648 square miles, and the population in 1881 was 682,012. The shortest distance from Sardinia to Italy is 115 miles, to Sicily 170 miles, to Africa 120 miles, and to France 180 miles. The island contains excellent harbours; St. Pietro and Porto Conte on the western coast, the roadsteads of Maddalena on the north, and Terravona on the east, besides the spacious bays of Cagliari (one of the best in the Mediterranean), Palmas, Oristano, and Alghero, and the roadsteads of Viguola, Tortoli, and Porto Torres.

Sardinia is separated from Corsica, on the north, by the Straits of Bonifacio, 7 miles across at the narrowest part. The surface is generally mountainous—the highest peak being Mount Ginargentu, near the centre, which rises to about 6800 feet. The mountains along the eastern side consist of granite and schist, with large masses of quartz, mica, and felspar. West of this highland region, and extending along the centre of the island, there is a succession of fine plains intersected by ranges of smaller hills, and stretching in some places as far as the opposite coast, the rest of which is occupied by several unconnected mountain groups. The largest and most fertile valley is that of Campidano, between the gulfs of Cagliari and Oristano. A volcanic district extends along the centre of the island nearly from north to south.

The principal rivers of Sardinia are the Tirsi, the

Coguinas, the Flumendoso, and the Manna. The Tirsi, the Thyrsus of Ptolemy, flows into the sea on the south coast, after a course of 70 or 80 miles. The others are small and unimportant. The Manna enters the Lake of Cagliari, which lies west of the city of that name, and is 6 or 7 miles long by 3 or 4 broad. It communicates with the sea by seven channels through a narrow strip of sand, is navigated by flat-bottomed boats, and contains abundance of fish. There are no other large lakes in Sardinia, but numerous ponds and marshes. The coast is much indented, and there are many small islands near the shore. The chief of them are Asinara, off the north-west; San Pietro and Sant'Antioco, off the south-west; and Maddalena, Capiera, and Raizzoli, off the north-east points.

The climate of Sardinia varies greatly according to the seasons and localities. The extremes of heat and cold are therefore considerable. Hail and thunderstorms are rare, but rain falls copiously in the autumn. The plains and some of the lower valleys have been notoriously unhealthy ever since the time of the Romans. Cicero, Strabo, Martial, and in later times Dante, all speak in strong terms of the insalubrity of Sardinia. The malaria, called by the natives "intemperie," is peculiar in its effects, and requires great precautions on the part of those exposed to it. The inhabitants of these districts, during the unhealthy season, never leave their houses till an hour after sunrise, and always get home before sunset, taking every precaution to prevent the entrance of the poisonous gas by the door or window.

One-third of the area of the island is occupied by barren and stony deserts. There are still extensive forests, including pines, chestnuts, common evergreen, and cork oaks, in the northern parts; and the two latter only in the southern districts. In the plains trees have always been very scarce. Dwarf mulberries grow in abundance, but their cultivation is little attended to. Among fruit trees the fig, the vine, the apple, apicot, peach, almond, and prickly pear are the most common. Vegetables are fine and plentiful. Saffron is raised and is much used in cooking. The vine is extensively cultivated, both soil and climate being highly favourable to it; and though the process of manufacture is still imperfect, Sardinia produces some excellent wines. Malvasia, or Malmsey, and Muscat are both made here. There are several olive grounds, but the oil is of inferior quality. Wheat, maize, barley, beans, and pease are raised and exported, but agricultural operations are conducted in the rudest manner, although in ancient times the island was considered the granary of Rome. Near Milio, 12 miles N.N.E. of Oristano, excellent oranges grow; and cotton thrives near Cagliari, in the south. Cheese is a great object of rural economy, and forms an important article of export; it is made chiefly from sheep and goats' milk, and, being steeped in brine, has a salt bitter taste. Tobacco is grown in some districts, and is a royal monopoly. Salt is also a monopoly of the government, and a profitable branch of the royal revenue. The saltens are round the Gulf of Cagliari, at Oristano, Terranova, and on the northern coast west of Porto Torres.

Flax is cultivated to a small extent, and is woven into linen. The forests abound with stags, small deer, wild boars, foxes, and mufloni, or murvoni, a species of large sheep clothed with hair instead of wool. The last is supposed to be indigenous, and to be the animal from which the common sheep was originally derived. The skins of hares, rabbits, martens, and foxes are exported. The domestic animals are small and of inferior breeds, except the swine, which have the reputation of being among the best in Europe. Bulls are the principal beasts of burden. The fisheries of Sardinia are very productive, especially the establishments for taking the tunny fish, which are found on various parts of the coasts from April to July. There are also fisheries of anchovies, sardines, coral, and pearls.

The coral is polished and worked into necklaces, earrings, and other ornaments at Genoa, Leghorn, Marseilles, and Naples. The pearls are of inferior quality.

Sardinia was noted in ancient times for its gold, silver, and other mines, which were worked to a great extent, as is attested by vast excavations and remains of foundries. Mercury, iron, and lead are met with in various parts. There are hills and mountains in the island entirely composed of rich ore. In the eastern mountains are porphyry, basalt, alabaster, and marble. Chalcedonies, jaspers, cornelians, sardonyx, turquoises, and rock crystal are found in the mountains of the west.

The manufactures of Sardinia are limited to gunpowder, tobacco, salt, and (on a small scale) cotton, silk, woollens, and pottery. The principal items of the export trade to Great Britain and her colonies are lead ore, live cattle, cheese, corn, salt, wool, skins, &c.

The Sards were of old a very mixed race, partly of Celtic and Iberian stock, and partly of Greek and Etruscan race to which a considerable infusion of Carthaginian and afterwards of Roman blood was added. The name of the island (*Gr. Sardo*) was mythically referred to a son of Héraklès of that name. In later times Pisans and Spaniards settled in the towns and lower country. The mountaineers may be considered as the real descendants of the old Sards, who struggled hard against both Carthage and Rome. They are of middle stature and well formed, with dark eyes and coarse black hair. Italian is spoken by all educated persons in the large towns. The native tongue, which varies according to districts, is a dialect of the old Romance, and is evidently derived from the Latin, with an admixture of words of Greek and Arabic origin. At Alghero the Catalanian is generally spoken, the inhabitants being in great measure the descendants of a Catalanian colony established by Peter the Ceremonious, king of Aragon, in 1355.

The most interesting antiquities of the island are the buildings called *Naragh* or *Narraggi*, which are peculiar to it, and consist of conical piles of rough stone without mortar, terminating above in a terrace. The interior has several chambers one above another, $4\frac{1}{2}$ feet wide and 7 feet high, with niches in the walls. The outer doorway is very small, and spiral staircases lead to the chambers. Many of these buildings stand alone, others on a common foundation, and there are about 3000 of them. Scientific education is given by the two universities of Cagliari and Sassari, each of which has a library and a cabinet of natural history. There is now also a primary school in each village.

SARDINIAN STATES (*Stati Sardi*) now form the north-west portion of the kingdom of Italy. They were formerly a separate kingdom, consisting of (1) the Continental States, and (2) the island of Sardinia. [See SARDINIA.] The continental portion comprised the duchy of SAVOY, now divided into the French departments of Savoie and Haute Savoie, the country of Nice, now the French department of Alpes Maritimes; the principality of PIEMONTE, the duchy of GENOA, &c. Full particulars will be found under these articles, and in ITALY, KINGDOM OF.

The history of the country is identical with that of the house of Savoy, whose first historical ancestor seems to have been Humbert, count of Maurienne, and great vassal of Rudolf III. of Burgundy, at whose death in 1032 the Burgundian kingdom had become merged in the Holy Roman Empire. The Emperor Conrad, about 1040, conferred upon Count Humbert the military jurisdiction over Maurienne and other parts of Savoy, the lower Valais, and also the valley of Aosta. Humbert's son Otho extended his dominions to the banks of the Po by a fortunate marriage, and his sons and successors took the title of Counts of Savoy. By degrees the family lost its Burgundian possessions, but gained more and more on its Italian side. Gradually the house became one of the leading secondary houses in Europe. Thus Count Peter (1263-68) visited

England in 1241, and was received with great honour by Henry III., who had married his sister. He was created Earl of Richmond, and received for his residence a palace in London on the banks of the Thames, which was from that circumstance called Savoy House. He had a great reputation for wisdom and chivalric gallantry, obtained possession of the fine district now known as the Canton de Vaud, in Switzerland, got his brother Boniface made Archbishop of Canterbury, and in other ways increased the power of his family. Other sisters of this fortunate prince were Margaret, queen of Louis IX. of France; Sanchia, queen of Richard of Cornwall, king of the Romans and brother of Henry III. of England; and Beatrix, queen of Sicily.

Under Amadeus VIII. (1391-1440), the "Red Count," the whole of Savoy, which had been split into small states held partly by the Counts of Savoy and partly by the Marquis of Montferrat and the Prince of Achaia, was finally united under one crown; he bore the titles of Duke of Savoy, Chablais, and Aosta, Prince of Piedmont, Count of Genevois, Bugey, and Nice, Baron of Vaud and Faucigny, and Marquis of Italy; and from his time the house of Savoy assumed a distinguished place among the sovereign houses of Europe. Amadeus resigned his crown to his son in 1440, on his being elected Pope by the Council of Basel. He took the title of Felix V., but was persuaded to retire in favour of Pope Eugenius IV. and end the painful schism, in 1449. The son and successor of Amadeus, Louis or Ludovic (1440-65), married into the royal family of Cyprus; and the title of King of Cyprus and Jerusalem is still assumed by their representatives. With the sixteenth century, and especially under Duke Charles III. (1504-53), Savoy was involved in many wars. Its dominions, placed as they were between France and the German Empire, whose jurisdiction extended over North Italy, rendered its position extremely delicate, especially in the long wars which broke out in the sixteenth century between the house of Austria and France. The Duke of Savoy had the title of Imperial Vicar in Italy, and was by interest as well as duty generally attached to the imperial cause; but the varying course of politics sometimes threw that interest into the opposite scale, and Piedmont and Savoy were thus frequently devastated by French, Imperialist, and Swiss armies. In one of Duke Charles' struggles with the city of Geneva, which he claimed, Bonnivard the Genevese leader was taken prisoner, and Duke Charles kept him for six years in the prison of Chillon in the midst of the lake. Bonnivard's sufferings are made immortal in Byron's verse. Eventually Savoy lost all her lands north of the Lake of Geneva, and was quite worsted in her claim on Geneva itself. At Charles' death the French were occupying Savoy, and his son and successor, Emmanuel Philibert (1553-80), was almost a duke without a duchy. The peace of Cateau Cambresis in 1559, between Philip II. of Spain and Henry II. of France, restored part of Savoy to the duke; and a marriage with the French king's sister brought back the rest of his Italian possessions, except Saluzzo (and this was reconquered in 1688). Thus the Burgundian house of Savoy holding Italian possessions, was converted into an Italian state holding Transalpine possessions. Italian and French became the language of the court; Piedmont, not Savoy, its main province; Turin, not Chambéry, its capital.

Victor Amadeus II. (1675-1730) was the next duke who greatly improved and strengthened his dominions. After being involved for many years in the wars between France and the Emperor, he obtained, by the peace of Utrecht in 1713, the Valais, the territory of Lomellina, the remainder of Montferrat, and other districts, and above all, the island of Sicily, with the title of king, and was crowned king at Palermo in December, 1713. Not only had Victor Amadeus given timely help to the Emperor

against France, and suffered much in his cause, but his distinguished relative Prince Eugene had, next to our own Marlborough, been the chief instrument of the downfall of the French supremacy; and this somewhat explains the sudden accessions of power and dignity received by Savoy from the grateful monarch. By the subsequent treaty of London, King Victor resigned Sicily to the Emperor, and received in exchange the inferior island of Sardinia, but still retaining the royal title. Thus the house of Savoy was at last numbered among the royal houses of Europe. Victor Amadeus employed the peaceful period which followed to improve the administration, recruit the finances, and encourage agriculture and industry. Through his care the cultivation of the mulberry tree and the rearing of silkworms attained in Piedmont that perfection which they still maintain, and he founded several colleges. King Victor was a born intriguer, and gradually got so far involved that he felt it necessary to cut the knot by abdicating in favour of his son Charles Emmanuel in 1730. As soon as the latter had shaken himself free from the entanglements of Victor, the latter wished to resume the crown; but this Charles would not allow, and on Victor entering into plots against him, the son (with reluctance) interned his father in the fortress town of Rivoli, where he kept him under honourable surveillance till his death in 1732. This has afforded the poet Browning material for one of the finest of his dramas. Charles Emmanuel III. (1730-73), in the War of the Spanish Succession, espoused the cause of Maria Theresa. He saw that the French had become powerful in Italy, and it was not his interest to favour their further aggrandizement. He left to his successor a compact and extensive territory, a thriving population, a fine army, and a full treasury. His son, Victor Amadeus III. (1773-96), was less sagacious and less fortunate. The storms of the French Revolution rendered the end of his reign calamitous. He lost Savoy and Nice in 1792, Oneglia in 1794, and in 1796 he was forced to conclude a hasty peace, which left his dominions at the mercy of the French. He died in October, 1796. Charles Emmanuel IV. (1796-1802) succeeded his father on a tottering throne. Savoy and Nice were united to France, and Piedmont was overrun by French troops, who held the principal fortresses in their hands. As long as Bonaparte remained in command in Italy, he observed some degree of respect towards the King of Sardinia, but after his departure the generals, commissaries, and other agents of the Directory heaped insult upon insult on the fallen monarch, and exaction on exaction on his unfortunate subjects, until he was obliged to retire to Sardinia in 1799. In 1802 he abdicated in favour of his brother, Victor Emmanuel I.

Victor Emmanuel I. (1802-21), seeing no chance of being restored to his continental states, withdrew to the island of Sardinia. In the year 1814, after the fall of Napoleon, he returned to Turin, and took possession of the dominions of his ancestors, to which the Congress of Vienna added the Genoese territory. An insurrection among his nobles induced him to abdicate in favour of Charles Felix (1821-31), his brother. Charles Albert (1831-49), a collateral relative of Charles Felix, succeeded, and reigned peacefully till the European revolution in 1848 involved him in a contest with Austria. In February, 1848, he promulgated a constitution for his dominions, comprising a legislature of two chambers, an annual convocation of the chambers, a free press, and other reforms. He joined the Milanese, Venetian, and other states, in opposition to Austria, in 1848-49, and even attempted to expel the Austrians from Italy; but in this bold enterprise he failed, and in March, 1849, after his defeat at Novara, he abdicated in favour of his son, Victor Emmanuel, who immediately concluded a peace with Austria. Charles Albert died 28th July, 1849, at Oporto.

Victor Emmanuel II. (1843-78), under the guidance of his able minister, Count Cavour, made Piedmont a constitutional monarchy, to which all Italy began to look as the nucleus of a future Italian kingdom. His straightforwardness and honourable conduct gained him the familiar title of *il re galantuomo*. He raised the morale of his army by joining the English and French in their war against Russia; and the Sardinians, under General La Marmora, proved their gallantry at the battle of the Tchernaya, in the Crimea, 16th August, 1855. Marrying his daughter Clotilde to Prince Napoleon, the cousin of the Emperor Napoleon III., he cemented the alliance with France, and breaking out into open war with Austria, obtained the powerful aid of France in the battle-field at the price of the cession of Savoy and Nice. The Austrians, defeated at Magenta (4th June, 1859) and Solferino (24th June), were glad to conclude the treaty of Villafranca (12th July, 1859), which gave Lombardy to the Sardinian monarch. The enterprise of Garibaldi afterwards made him master of the Two Sicilies (October, 1860), and Tuscany, Modena, and Parma revolting against their princes, declared for Victor Emmanuel. The first Italian Parliament met on the 18th of February, 1861; Victor Emmanuel assumed the title of King of Italy, was recognized by the Great Powers, and removed his capital from Turin to Florence (December, 1864). The Italian desire for unity, however, could only be appeased by obtaining Venice and Rome. Venetia fell to Italy as the reward of her alliance with Prussia in the Seven Weeks' War against Austria in June, 1866, and Rome was taken by the Italian troops, after a slight resistance, on 20th September, 1870. Thus the counts of Savoy have gradually risen to the proud position of kings of Italy—of an Italy brave, prosperous, and enthusiastic, and united from the Alps to the Mediterranean. See ITALY.

SAR DONYX, a valuable member of the CHALCOPHONY group of inferior gems. It is a rare stone, consisting of alternate layers of SARD and nearly opaque white chalcedony, and has been employed from the earliest times as the material for the finest cameos. A sufficiently good imitation of the stone is frequently made by placing a piece of sand upon a red-hot iron, and so imparting to the surface in contact an opaque white appearance.

SARGASSO SEA, a broad area in the western part of the North Atlantic Ocean, which is comparatively free from currents, the course of the Gulf Stream being round the Gulf of Mexico, then across to the Azores, where it divides, the southerly current turning in a right-handed curve by Portugal and the Cape Verde Islands till it gets a westerly course and reaches the Gulf of Mexico again. It is considered that it takes a particle of water about two years and ten months to complete this circuit. Within this curve lies a broad area where all drift wood and other foreign bodies, sloughed off the current on its right side as it turns, collect undisturbed. The Gulf Weed (*Sargassum bacciferum*), which grows without a root, covers leagues and leagues of the water surface of this area, giving a home to millions of fish, crustaceans, and molluscs. The weed is not found at all in the Gulf Stream itself.

A similar tract, though not so densely weeded, is found in the central area of the South Atlantic, and though it is marked rather by driftwood, &c., than by Sargassum weed, is sometimes called by meteorologists a Sargasso sea. A third such area is said to exist in the central area of the North Pacific, but has as yet not been much studied.

SARGASSUM. See GULF-WEED.

SARK, the third in size of the Channel Islands, situated about 7 miles eastward of Guernsey, 11 miles north-west from Jersey, 18 miles south-west from Alderney, and about 24 miles from the French coast. Its area is nearly 1280 acres, and its population in 1881 was 300. The island, $3\frac{1}{2}$ miles in length by about $1\frac{1}{2}$ in breadth, really consists

of two islands (Great and Little), connected by a natural roadway about 450 feet long, and from 5 to 8 feet across, and raised precipitously 384 feet above high-water mark. The coasts are rocky and full of interesting caves. The usual landing-place is at Le Creux. The earliest event recorded is the foundation of a monastery by St. Maglorius, about the year 565, which seems to have lasted till 1319, when the monks left. In the reign of King John it was seized by a noted pirate, Eustache le Moine; and after the monks left it seems to have become the resort of robbers of all kinds.

SARMA'TIA was the name given by the Romans to all the country in Europe and Asia between the Vistula and the Caspian (our Eastern Poland and Southern Russia). It was bounded on the south by the Euxine and Mount Caucasus, and was divided by the Tanais (Don) into Sarmatia Europea and Sarmatia Asiatica. The people inhabiting this country were usually called Sarmatæ by the Greeks and Sarmatæ by the Romans. It is manifest that the syllable *sarm*, from which the word is made up with the ordinary classical termination, is the same as *sarb* or *ser*; and that the Sarmatæ, though the term is very loosely used, are to be taken as the Slavonic peoples in general. Serbia still preserves the name in one of its forms.

SAR RACENIA' CÆÆ, an order of plants belonging to the POLYETALÆ. It consists of herbaceous perennial plants resembling rushes, with fibrous roots and radical leaves with a hollow rim shaped or pitcher-shaped petiole, at the point of which is articulated the lamina or blade of the leaf, which covers the petiole like a lid. They are interesting on account of their pitcher-like leaves, which are insectivorous. [See PITCHER PLANTS.] In this order the flowers have five imbricate sepals, five imbricate petals, numerous hypogynous stamens, a superior three to five-lobed ovary, with an axile, many-seeded placenta, a single style, a loculed capsule, seeds with a minute embryo in copious perisperm. There are only three genera—*Sarracenia* in the United States, *Darlingtonia* in California, and *Helophora* in Guinea.

SAR SAPARIL LA (Spanish *carra*, a bramble, and *parilla*, a vine) is the root of several species of *Smilax*, natives of various parts of tropical America. All these species agree in being large perennial climbers, with a short root-stock (*rhecome*), at the thickened nodes of which spring numerous roots, 6 to 8 feet long. One species affording sarsaparilla is *Smilax officinalis*, which is found in Grenada and in Veragua, Central America. Another species is *Smilax pappayana*, found in Guinea and Brazil; and another is *Smilax saphotea*, which grows in Grenada. Several sorts are known in the shops, the principal of which are Jamaica or Red Sarsaparilla, Brazilian Sarza, Honduras Sarza, and Vera Cruz Sarza.

Jamaica sarsaparilla is so named because it was first brought from Columbia by way of Jamaica. Vera Cruz or Mexican sarsaparilla is the produce of *Smilax medica*.

The virtues of sarsaparilla are the subject of much diversity of opinion, many practical men deeming it very useful, while others consider it nearly worthless. It is chiefly used in chronic syphilitic, rheumatic, gouty, serofulous, and cutaneous diseases. Its most obvious action is diaphoretic, but in cases where the patient is kept cool diuretic.

The imports of sarsaparilla into the United Kingdom amount annually to about 300,000 lbs., and the average price is 1s. per lb. The largest quantities are received from Grenada, Belize, the United States, and Cuba, and about half the entire quantity imported is re-exported.

The genus *Smilax* belongs to the order Smilacæ, and is found in the warm regions of the whole world. The leaves are petioled, with a tendril on each side of the stalk. The flowers are in globular heads; there are six segments

in the perianth, and six stamens; the fruit is baccate, with one to three seeds.

East Indian sarsaparilla is a root used in medicine, and sold by druggists as a substitute for the true sarsaparilla under the above name. It is imported from India, and is the produce of *Hemidesmus Indicus*, a plant found within the limits of that country, of the order ASCLEPIADEÆ.

SAR'SEN STONES or **GRAY WETHERS** are more or less angular blocks of hard sandstone and conglomerate found lying upon the surface of the chalk districts of Wiltshire and Somersetshire. They are evidently the more compact portions of once-continuous deposits of Tertiary strata that were spread over the areas where they occur, but which have now been removed and destroyed by DENUDATION. The first name for these curious stones is derived from a popular notion that they were scattered in their present situations by the ancient Saracens; while the second term has reference to their curious resemblance, when seen from a distance, to flocks of sheep.

SARTHE, a department in France, formed out of Maine and a small part of Anjou, is bounded N. by the department of Orne, E. by Eure-et-Loire and Loir-et-Cher, S. by Indre-et-Loire and Maine-et-Loire, and W. by Mayenne. Its greatest length from N. to S. is 62 miles; from E. to W. 58 miles. The area is 2400 square miles, and the population in 1881 was 438,917.

Hydrography.—The department takes its name from the river Sarthe, which rises near the ancient abbey of La Trappe, not far from Moulin-la-Marche, in the department of Orne. It flows first in a south-west direction till it reaches the northern boundary of the Sarthe, along which it runs in a more westerly course; on reaching the western boundary it runs south for about 2 miles between the Sarthe and the Mayenne, and thence S.S.E. past Fresnay and Beaumont to Le Mans, just below which it receives the Huisne and becomes navigable. The river then resumes the original south-west direction, and passing out of the department below Sablé it enters Mayenne, where it receives the Loir on the left and the Mayenne on the right, a little above Angers, below which the united waters take the name of Maine, and empty themselves into the Loire on the right bank at Ponts de Cé. With the exception of the Huisne, which, flowing out of Orne, drains the north-east of the department, and the Loir, which drains the southern and south-eastern districts, the feeders of the Sarthe are small. The Vegre and the Erve enter it on the right bank near Sablé. The Braye, a feeder of the Loir, runs for several miles along the eastern boundary.

The surface is generally level, and inclines gently to the south-west. The north of the department, and all of it that lies on the right bank of the Sarthe, has a good soil, which yields wheat, some maize, buckwheat, pulse, melons, and pumpkins. The rest of the district lying between the Sarthe, the Loir, the Braye, and the Huisne, and for some distance from the right bank of the last-named river, has a poor light soil, resting upon chalk, and presents many bare sandy flats, some of which, however, are planted with pines. Rye is the most general crop. Hemp and flax are cultivated wherever the soil is favourable for their growth. Clover seed is an important article of farm produce, and is largely exported. Walnuts, excellent chestnuts, and fruits of various kinds, are grown extensively, especially apples for making cider, which is the common beverage of the peasantry. Great quantities of wine, and some perry, are also made. There is an abundance of meadow and open pasture land, so that large numbers of horned cattle, sheep, and pigs are fed for the Paris and other markets. Horses are in general of small size; some mules are bred. Poultry is excellent, and forms an important article of export to Paris. In the arrondissements of Le Mans, Mamers, and St. Calais, there are extensive forests. The climate is mild and healthy.

Iron mines are worked; red and yellow ochre, flint, marble, slate, millstone grit, limestone, sandstone, marl, and potter's clay are found; anthracite coal mines are in full operation in the west of the department. There is a salt spring at La Suze. The manufactures, which are unimportant, comprise sailcloth, brown linen, printed cottons, blankets, cotton handkerchiefs, paper, leather, and iron.

Sarthe is intersected by two or three lines of railway, converging on the chief town LE MANS. There are some Druidical monuments; the most noteworthy are those at Conneré, a village north-east of Le Mans on the Huisme. The department covers an area of 1,536,000 acres, and is divided into the four arrondissements of Le Mans, Mamers, St. Calais, and La Flèche.

During the war of 1870-71 this department was the scene of the final overthrow of the French army of the Loire. This army was the largest of the levies gathered after the fall of the empire. It gave the Germans a considerable amount of trouble, and achieved the respectable success of driving the Bavarians from Orleans; but was beaten back gradually to Le Mans, where the united forces of Prince Frederick Charles and the Duke of Mecklenburg defeated and dispersed it in the course of a short winter campaign, ending in the capture of Le Mans, 12th January, 1871.

SAR'TO, ANDREA DEL, the common name of *Andrea d' Ignolo* or *Vannucchi*, so called from the occupation of his father, a tailor (Ital. *sartore*). Andrea was born at Florence in 1487, and first studied under Piero di Cosimo; he afterwards worked on his own account on the lines of Massaccio, Lionardo, and Michelangelo. In 1518 he visited France on the invitation of Francis I., who intrusted him with some money to purchase works of art for him. Andrea returned to Italy in 1519, but there squandered the money, and was ashamed to return to France. He died at Florence of the plague in 1530, aged only forty-two. His most important works are the frescos of the Annunziata at Florence. He was altogether one of the best of the cinquecento painters, and has been called by his countrymen *Andrea senza Errori* (Andrew the Faultless); that is, with reference to his style as a painter. An exquisite portrait of himself is one of the glories of the National Gallery; but his finest oil picture is probably the superb Madonna of the Uffizi, Florence, which, as far as perfect blending of harmonies of colour and flawless workmanship are concerned, is one of the great pictures of the world. Andrea's wife is believed to have been the cause of his difficulties, and to rid himself of the debts brought on by her extravagance, he frequently painted hastily and without enthusiasm in his latter years. Hence the unevenness of his work as a whole.

SAR'UM. Old Sarum, situated about $1\frac{1}{2}$ mile north from Salisbury, is generally regarded as the *Sobiodunum* of the Romans. Under the Anglo-Saxon and Anglo-Norman princes ecclesiastical and civil councils were held here, and the town became the seat of a bishopric.

The inhabitants of Old Sarum migrated to New Sarum [see SALISBURY] in consequence of the scarcity of water. They began to remove in the reign of Richard I., and the old town was totally deserted in the time of Henry VII. Nevertheless it continued to return two members to Parliament until it was disfranchised by the Reform Act of 1832.

The earthworks of Old Sarum are very conspicuous. They lie on the right of the road from Marlborough to Salisbury, and consist of a circular or rather oval intrenchment, a smaller intrenchment of similar form within the first, and some earthen banks extending from the inner to the outer intrenchment, and subdividing the area between them. There are a few fragments of the walls, castle, and cathedral still remaining.

SASKAT'CHEWAN ("swift current") is the name of a river of British North America, rising in the Rocky

Mountains, near 115° W. lon., by two principal heads—one in lat. 49° , the other in $53^{\circ} 30'$ W. These branches flow generally in an easterly direction till they unite, about 105° W. lon., after which the river runs in a very tortuous course to its mouth in Lake Winnipeg, its entire length being about 1600 miles. It is navigable for about 1000 miles, and gives name to a wide district. The outlet river from Lake Winnipeg is called the Nelson, and connects the navigation with Hudson Bay. The climate of the valley of the Saskatchewan is very healthy, though in winter the cold is severe. Coal and iron of the best quality exist in several places, the former having been discovered in 1860. Gold has also been found on the northern arm of the river.

SAS'SABY (*Alephalus bunatus*) is a South African ANTELOPE, the Bastard Hartbeest of the Cape colonists. It stands about $4\frac{1}{2}$ feet high at the shoulder, and is furnished with strong horns nearly 12 inches in length, crescentic, with the points directed inwards. The body is stoutish, the neck short, the limbs slender, the withers elevated, the lachrymal sinus inconspicuous, and the ears 8 or 9 inches long. The tail is nearly 2 feet long. The general colour of the fur is rufous-gray; the upper parts and legs have a deep brown tint, the forehead marked by a dark longitudinal band. The sassaby is naturally tame, but is much hunted by the natives; it is met with in small herds. The female is comparatively small, and furnished with two mammae.

SAS'SAFRAS, the name of a genus of plants belonging to the order LAURINEÆ. The species most known is *Sassafras officinale* (the sassafras laurel), celebrated for its medicinal virtues. It is an inhabitant of the woods of North America, from Canada to Louisiana, and is found beyond the Mississippi. It is mostly a small tree or bush, but sometimes attains the height of 40 or 50 feet. The leaves vary much, ovate and three-lobed leaves, with intermediate forms, occurring on the same branch. The flowers are greenish-yellow and drooping. It was introduced into England in 1597 as an ornamental tree. The wood is employed for making bedsteads and other articles of furniture, which are not liable to the attacks of insects and give out a very agreeable odour. The root is the official part in the British Pharmacopœia; but the whole possesses the aromatic fragrance common to the Laurineæ, and some assert that the bark of the stem and branches is stronger than that of the root; but this seems to be an error. The taste is sharp, acid, aromatic, and, as well as the odour, resembles that of fennel. Sassafras acts as a stimulant to the circulation, especially of the capillaries, causing an increased secretion from the skin, if the person be kept warm, or from the kidneys, if kept cool. Should these organs fail to be influenced by it, heat and general excitement with headache are the results. It is of unquestionable utility in gout and rheumatism, but its activity is generally destroyed by the improper mode of administering it. Decoction dissipates the volatile oil, and is a most objectionable preparation. Infusion or a tincture may be used, or the volatile oil rubbed up with sugar.

SAS'SANIDS, a great Persian dynasty, founded by *Ardshir*, grandson of a certain Sassan (unknown) which held the crown from A.D. 226 to A.D. 651. See PERSIA, section *History*.

SAS'SARI, a town of Italy, situated on a gentle declivity in the north-west part of the island of Sardinia, 59 miles N.N.W. of Cagliari, and 13 miles from its seaport, Porto Torres. It is well built, is the seat of an archbishop, has a cathedral and numerous churches, a museum, public library, university, town-hall, hospital, and theatre, and some fine public walks. It has some trade in the produce of the fertile district around, including grain, olive oil, and tobacco, and also in wool. The population in 1881 was 36,817. A terrible outbreak of cholera in 1855 carried off one-third of the inhabitants within twenty days.

SASSOFERRATO, the name, derived from his birth-place, by which *Giovanni Battista Salvi* is commonly known. He was born at Sassoferrato in 1605, and died at Rome in 1685. He was a follower of the Carracci, and is distinguished for the brilliant colour and elaborate finish of his pictures. There is a splendidly preserved Madonna by this master at his very best in the National Gallery.

SATAN. See **DEVIL**.

SATIN. See **SILK**.

SATIN WOOD. See **CEDRELE**.

SATIN SPAR, a popular name applied indiscriminately to the finely fibrous varieties of gypsum, **CALCITE**, and **ARAGONITE**, in allusion to their beautiful silken lustre. All being white, they cannot readily be distinguished upon a superficial glance, but the addition of dilute acid at once marks off the two latter from the first, in consequence of their being carbonates, and thus producing effervescence. The fibrous calcite, again, can be recognized by its distinct rhomboidal cleavage, readily splitting into rhombohedra; while aragonite only exhibits a comparatively uneven surface when fractured, with no definite crystalline facets.

SATIRE, a species of Roman poetry, which must not be confounded with the satyric drama of the Greeks. The Latin word *satira* is originally the misquotation of the "full people" who, enveloped in goat and sheep skins, wound up the festival with then jokes. The Roman satire is first mentioned as a kind of dramatic performance by Livy (vi. 2). This species of composition arose from the practice, which has prevailed in Italy from the earliest times to the present day, of the country people making rude extemporaneous verses at various festivals, and especially at the time of vintage. The kind of poetical verse, little better than doggerel, in which these *satire* were sung, was called *Saturnum* [See **SATURNIAN METRE**], and is elsewhere fully described. It was used by Nævius for his history, but was rapidly driven out by Greek models. Its freedom allowed a corresponding freedom of subject, and it was used freely for occasional compositions, for letters (i.e. formal epistles), for sketches, &c. When the old metre disappeared, its freedom and caustic mirth were still preserved and transferred to the new modes of expression, and thus grew up a species of poetry peculiar to the Romans, in which Lucilius is said to have been the first writer. It was Lucilius, however, who, in the second century B.C., constructed satire on those principles of art which were considered in the time of Horace as essential requisites in a satiric poem. Lucilius principally used the hexameter metre, which was afterwards almost exclusively employed by the satiric poets. His poems were not only humorous satires upon the vices and follies of mankind in general, but also contained attacks upon private individuals. They formed the model on which Horace wrote his satires in the 1st B.C. century; but the circumstances of the times prevented him, even if he had had the inclination, from attacking prominent political characters, as Lucilius had done. The first century of our era produced Persius as a satirist, who, though not the equal of Juvenal or of Horace, is yet to be numbered among the most popular writers of the world; it is matter for regret that only six short satires remain of his writings. The increased corruptions of morals at Rome under the early emperors, and the cruel punishments which had been inflicted by Domitian upon the wise and the good, naturally led Juvenal in the earliest years of the second century to attack the vices of his age with severity and vigour. The works of the other great Roman satirists are lost, with the exception of fragments. In England satire has always been cultivated with great success, and the names of Dryden, Butler, Swift, Pope, Johnson, Gay, Churchill, Gifford, Byron, Wolkot, Burns, Cowper, Moore, Hook, Jerrold, and Thackeray will remind the reader that English literature in this department is not inferior to the French. France, too, may reasonably boast of her Rabelais,

Molière, Scarron, Voltaire, Boileau, and Béranger; and Germany of Rabener, Stolberg, Wieland, Tieck, and Goethe. In every country liberalism of opinion, whether in art, literature, religion, or politics, will naturally seek expression in the satirical form.

SA'TRAP (in Greek *satrap's*) was the name of the governor of a province under the old Persian Empire, established by Darius Hystaspes about 516 B.C. Satrap is undoubtedly a Persian word, but Oriental scholars have given very different explanations of it.

SATURA'TION. In physics and in chemistry a solution is said to be saturated when the liquid forming its basis has taken up as much as it possibly can retain of the solid, liquid, or gas it is dissolving. An acid is said to be saturated when a sufficient amount of base is added to it to form a neutral salt; and conversely, a base is said to be saturated when a similarly sufficient amount of acid is added. Saturation may exist with regard to one body and not to another: thus water saturated with common salt will still dissolve sulphate of soda or sugar, and *vice versa*.

Supersaturation is the name given to that peculiar property possessed by many liquids of dissolving an increased quantity of a solid at a high temperature, and yet retaining it when cooled, whereas they could not possibly take up as much in the cool state. A striking instance to the contrary is that of lime, of which it takes much more to saturate cold water than hot. A liquid may be supersaturated with a gas, as when, for instance, after a body of water or other liquid has absorbed its ordinary volume of carbonic acid gas, it is made by pressure to take up another volume of the gas, as in the manufacture of soda water, champagne, &c. Looked at critically, a liquid close to the boiling point is seen to be a supersaturated solution of its own vapour. Supersaturated saline solutions possess remarkable properties; as for instance sodic sulphate (Glauber's salt) when supersaturated and cooled will remain a long time without crystallizing, if covered by glass or protected by cotton wool from the nuclei floating in the air; and a large number of other salts follow the same rule.

In meteorology the air is said to be saturated with moisture when it is in such a condition that no more moisture can be added without condensation taking place. This condition varies with the varying temperature, and air at a higher temperature absorbs more moisture before it reaches the point of saturation than air at a lower temperature [See **METEOROLOGY**.] It follows that any two saturated currents of air at different temperatures will, if they mix, produce a joint mass which will be over-saturated and ready for immediate condensation—one of the most frequent modes of the formation of RAIN.

In magnetism the term is applied to that amount of magnetization which a magnet can permanently retain. It is easy, and in fact usual, to overcharge a steel bar when making it into a magnet; and the excess is afterwards allowed to dissipate. The point of saturation is higher the more finely tempered and harder is the steel. If a magnet is considered to be weaker than its full normal strength, it must be highly charged and then left (without a keeper if it be of a horse-shoe form) to subside to the point of saturation.

SAT'URN, the name given to the planet which revolves around the sun in an orbit outside that of Jupiter. In the article **SOLAR SYSTEM** will be found a general description of the planetary orbits; we here give the additional details with regard to Saturn. The path of Saturn is an ellipse, the mean distance of which is 9.538852 times the mean distance between the earth and the sun. If we assume the distance from the earth to the sun to be 92,833,333½ miles, then the mean distance of Saturn from the sun is 881,900,000 miles. In our year of 365½ days Saturn sweeps around the sun through an angle of 439°26'0508".

It can be inferred from this figure that the periodic time in which Saturn accomplishes a complete journey is 29·46 years, and its orbital velocity is 5·95 miles per second. The plane of the orbit of Saturn is inclined to the plane of the ecliptic at an angle of $2^{\circ}29'39\cdot80''$, and the longitude of the ascending node was $112^{\circ}20'52\cdot9''$ at the epoch 1850·0. The eccentricity of the orbit of Saturn is ·0559428, being more than three times as great as the eccentricity of the earth's orbit. The longitude of the perihelion is $90^{\circ}6'56\cdot5''$, and the mean longitude of Saturn at noon on the 31st December, 1849, was $14^{\circ}50'28\cdot49''$. The mass of Saturn, as compared with that of the sun, is $\frac{1}{3547}\cdot8$. Jupiter is the only planet which exceeds Saturn in mass, being in fact more than three times as heavy. The polar diameter of Saturn, if viewed at a distance equal to the mean distance of the earth from the sun, is $146\cdot3''$; the equatorial diameter under like circumstances would be $162\cdot8''$. The mean diameter of Saturn in miles is 70,500, and the planet rotates on its axis in a period of 10 hrs. 14 mins. Saturn is the lightest of the planets; its density compared with that of water is 0·750, and compared with that of the earth 0·1325. The gravitation at the surface of Saturn, as compared with that at the surface of the earth, is 1·18.

Saturn is pre-eminent in the whole solar system for the wondrous rings by which it is surrounded. In the early days of telescopes the curious appendages to the globe were a source of great perplexity. To Galileo the planet appeared as a large globe with two small globes, one on either side. The real nature of Saturn was discovered by Huyghens in March and April, 1655, and he announced that it was girdled by a thin ring, nowhere touching, inclined to the ecliptic. Owing to the thinness of the ring it was quite invisible to the telescopes of that period when the plane of the ring passed through the earth. This happens twice in every revolution of Saturn, just as the earth's equator is twice directed towards the sun in the course of the year. The ring is inclined to the plane of Saturn's orbit by 27 degrees, just as our equator is inclined to the ecliptic at an angle of $23\frac{1}{2}$ degrees.

When Saturn is in 262 degrees of longitude, in the constellation Sagittarius, the northern side of the ring is then seen at an inclination of 27 degrees. This phase occurred in 1870, and will occur again at the end of 1899. In 1878 the edge of the ring was turned towards the sun, so that only a thin line of light was visible. The planet was then between Aquarius and Pisces. In 1885, when the planet was in Taurus, the southern side of the ring was seen at the greatest elevation, while in 1892, the planet being then in Leo, the edge of the ring is again turned towards the sun. The four phases here referred to occur at average intervals of about seven years and four months. The conditions under which Saturn and his ring can be best seen are—(1) that the ring shall be inclined at the largest angle; (2) that Saturn shall be at his perihelion; and (3) that he shall be at his greatest altitude. All these conditions nearly combined between the years 1881 and 1885, so that during these years Saturn was seen to very great advantage.

The ring is very clearly divided into two concentric rings separated by a dark line, which can be traced all round in a good telescope. The outer ring is also marked by a concentric circular line, but it is doubtful whether this is really a division. Inside the interior bright ring is a third ring, seemingly continuous therewith, but very much less conspicuous. It is known as the *crape* or *dusky* ring, and extends about half-way to the planet.

The nature of the ring has been the subject of much mathematical investigation. It is now generally believed to be formed of a cloud of minute satellites too small to be distinguished separately, yet so close and so numerous that from our distance the ring seems to be solid. They may be like the separate small particles of water which in our atmosphere give to clouds an apparently solid aspect.

Saturn is attended by no fewer than eight satellites, with the following elements:—

	Mean Daily Motion.	Mean Distance from Saturn.	Lon. of Peri. Sat.	Eccen- tricity.	Inclina- tion to Ecliptic.	Lon. of Node.
Mimas.	381·953°	—	?	?	28° 00'	168° 00'
Enceladus.	202·721	—	?	?	28 00	168 00
Tethys.	190·69773	42 70"	?	?	28 10	167 38
Dione.	131·534930	54·60	?	?	28 10	167 38
Rhea.	79·690216	76·12	?	?	28 11	166 34
Titan.	22·577033	176·75	257° 16'	·0285	27 34	167 56
Iapetus.	16·914	214·22	40 00	·125	28 00	168 00
	4·538036	514 64	351 25	·0282	18 44	142 11

SATURN (*Saturnus*), one of the principal indigenous divinities of the ancient Italians, was considered the protector of agriculture, whence he is generally represented with a sickle in his hand. His name probably contains the same element as the verb *sero* (participle *satum*), and he was considered as the protecting divinity of all that was sown and planted. The Italian legends represented him as having come from abroad to the shores of Italy, in the reign of Janus, by whom he was hospitably received. Notwithstanding this, Saturn was always considered as the first king of the aborigines, probably because agriculture and civilization in Italy dated from his reign. He taught the Italians the art of cultivating the fields, and led them from their savage state to the peaceful occupations of civilized life, so that the whole land of Italy was called, after him, *Saturnia*. His rule was so just and mild that the age in which he reigned was afterwards described as the golden age of Italy. He is not to be confused with the Greek *Kronos*, a deity of a very different type, although in the wholesale adoption of Greek mythology the Latin poets translated *Kronos* by Saturn. His wife, called Ops (that is, 'field-labour'), was in after-times worshipped as the goddess of plenty.

SATURNALIA, a festival celebrated by the Romans in honour of the god Saturnus, or rather in commemoration of the harvest season. It was probably instituted at Rome about B.C. 497. The Saturnalia was celebrated annually on the 19th of December, but after C. Julius Cæsar had added two days to this month, the celebration was on the 17th. As this caused some confusion, Augustus sanctioned the extension of the festival from one to three days (the 17th to the 19th), and Caligula and Claudius made it four days. The Saturnalia was a season of jollity and license, during which slaves had a holiday, and were allowed almost unrestrained liberty. It included three distinct fêtes—the Saturnalia, properly so called; the *Opalia*, in honour of Ops, the wife of Saturn; and the *Sigillaria*, so called from the *Sigilla*, an earthenware torso which was then exhibited. The Saturnalia still remains, in slightly altered form and time, as the Italian carnival.

SATUR'NIA is a genus of insects belonging to the Saturniidae, a family of Moths belonging to the group Bombycini. This family includes many of the largest moths known, which are distinguished by having a large round spot in the middle of each wing, either transparent or an eye-spot; the body is stout, and the antennæ are strongly pectinated. The only British species of the family and genus is the beautiful Emperor Moth (*Saturnia carpinis*). In this species there is a large eye spot in the middle of each wing, yellow in the centre, surrounded by a black ring and a half ring of blue. The wings in the female are gray; the male has the fore-wings reddish-brown, the hind pair rusty-yellow. The expanse of wing is between 2 and 3 inches. The caterpillar is bright green, with black transverse bands and golden tubercles bearing little tufts of bristles. It feeds chiefly on beech. The cocoon is pear-shaped and double, the loose outer envelope inclosing an inner cocoon of stiffer hairs, so con-

structed as to facilitate the escape of the insect, and at the same time prevent the entrance of others. The Great Peacock Moth (*Saturnia pyri*), found in Southern Europe, is the largest European moth, measuring 6 inches across the wings, which are dark gray with white borders. The nearly allied Atlas Moth of China (*Attacus atlas*) belongs to a genus which furnishes silk. See SILKWORM MOTH.

SATUR'NIAN METRE, a very ancient and strongly marked rhythmical accented verse, indigenous to the Latin races, and quite unknown to the Greeks. The name probably denotes nothing but "chant-measure," *satura* being the chant sung at the carnival or Saturnalia. Another name for this metre is *Lævium metre*. Mommsen ("Hist. of Rome") gives the following early specimen of it, with three accents in each line. We preserve the antique spelling, as it is quite easily intelligible.

"Quod re' sua' dife'dens—As'pere' affe'ct'a
Patens' timent' hinc vo'vit—Vo'to hoc' solu'to
Decuma' lact'a' polue'ta," &c.

The accents are observed to run in iambs in the first line of each pair, and trochees in the second, the iambs ending with an extra short syllable and a caesura. The translation of the above passage may run thus—"Dilect of his fortune, severely reprimanded, the anxious father here vowed, if this wish of his were granted, a title of his wealth as a banquet," &c. Another specimen is given in the article LATIN LANGUAGE, section *Republican Period*.

Of all the antique metres the Saturnian is the simplest, and it also claims the greatest liberty in running together short syllables (as in *decuma* in the illustration); its rough contrast of iambs and trochees and its sharp caesura had no chance against the swing of the pure Greek measures when they were introduced into Latin literature.

SATURNINUS, LUCIUS APULEIUS, was the chief figure in the first actual conflict which took place between Roman citizens within the walls of Rome. Of not great importance himself, his actions had a very great influence towards defining the attitude of the aristocratic and democratic parties, and precipitating the downfall of the great republic.

Saturninus was born about 135 or 140 B.C. He was quaestor in 104, and tribune of the people in 102 B.C. A public insult, the withdrawal of charge of the corn-importation in his quaestorship, followed by degradation by the Censor Metellus, drove him into the ranks of opposition; and his fiery demagogic eloquence readily procured his election as tribune of the people. Marius stood for his sixth consulship in B.C. 100, and Saturninus at the same time stood for a second tribunate, a low street-orator called Glaucia joining them and standing for praetor. Marius used his immense popularity and even bribes, and all three were returned (B.C. 100). Saturninus had caused his only serious opponent to be assassinated. He now brought forward laws of the wildest democratic or socialistic character. Vast tracts of land, in the conquered Carthaginian territory and in Italian Gaul, were to be colonized, and enormous treasures shared out to support the colonists in the cultivation of their allotments. The gigantic nature of the scheme would have kept Marius at the head of affairs for many years. In addition to this the price of government corn already reduced very low, was lowered to a merely nominal charge, so that Roman citizens could live practically for nothing. The old soldiers of Marius were secured in their fidelity by being lavishly provided for. The senate struggled in vain against these laws, the delighted people supported the conspirators at every turn. The laws were carried and the senate had to swear to them, all but Metellus, who honourably went into exile rather than compromise the state so fatally.

But at the moment of victory the plot failed. Saturninus was elected tribune a third time for the coming year 99, and Glaucia stood for the consulship. M. Antonius, one

of his competitors, was sure of election: the contest lay between Glaucia and Memmius. Under these circumstances Saturninus caused Memmius to be murdered, even before the voting place and in open day. Marius, already disgusted with his associates, deserted them at this. Popular indignation rose. The consuls were ordered to put down Saturninus and his friends as public enemies. The latter broke open the prisons, and with the criminals and slaves thus gained, took up a position on the Capitol, but were soon starved into submission. Whilst they awaited trial, confined in the Senate House (where Marius had placed them to try and save their lives), the youths among the enraged nobles climbed to the roof, pulled off the tiles and stoned them to death with them, 10th December, B.C. 100. Four chief ministers of state thus perished by mob law, a praetor, a quaestor, and two tribunes.

SA'TYRS (*Satyræ*) is the name by which the Greeks and Romans designated a class of rustic deities. Like the Pans and Fauns, they were a kind of intermediate beings between men and animals, and the physical features which they had in common with animals were chiefly derived from goats. They represented the vital forces of nature, brutish and sensual, yet not altogether animal, and were especially connected with the worship of Dionysos (Bacchus). Fond of wine, of beauty in woman, of music and dancing, they were a favourite conception of the classic poets. Properly they are represented with horns, pointed ears, and a short tail—otherwise human: but later on the poets gave them the goat legs of the Fauns, and confused them with the latter almost entirely.

SAUL, the son of Kish, a wealthy chief of the tribe of Benjamin, was distinguished by his noble bearing, great stature, and surpassing bravery. He was chosen as the first king of Israel, and the task which fell to him, the organization of the Jewish monarchy and the defeat of its numerous enemies, was one which his civil and military abilities eminently fitted him to discharge with success. His nature, however, was wild and wayward, and a long enjoyment of the regal power developed his worse qualities, which seemed to break out at times in a paroxysm of violent madness. He fell at last in battle against the Philistines, on Mount Gilboa, the heroism of his death redeeming in some measure the excesses of his later career. (For an admirable sketch of his reign, see Dean Stanley's "Lectures on the Jewish Church," second series.)

SAUMUR, a town of France, in the department of Maine-et-Loire, on the left bank of the Loire, here crossed by a fine bridge of twelve arches, 43 miles west of Tours. It is a picturesque little town, and consists of an upper town, with steep, irregular streets, and a well-built lower town, with a fine quay; and has several churches, an arsenal, riding school, manufactures of articles in glass and enamel, iron and copper wares, saltpetre refineries, a trade in corn, white wine, brandy, vinegar, hemp, flax, &c. The population in 1881 was 14,186. Its name is said to be a corruption of *Sous-le-Mur*, the first houses having had the appearance of being built beneath a wall of rock. Under Henry IV.'s secretary, Du Plessis-Mornay, the "Pope of the Huguenots," as the Catholics styled him, it became a flourishing Protestant town, having a good trade and a famous academy or temple; but it was ruined by the revocation of the Edict of Nantes. In the vicinity are several interesting stone monuments, including the largest and best preserved dolmen in France.

SAURIA. See LIZARDS.

SAURIN, JACQUES, an eminent French Protestant divine, was born at Nîmes, 6th January, 1677. He finished his education at Geneva, and in 1701 was made pastor of the Walloon Church in London, whence, after four years, he removed to the Hague, and remained there in the exercise of the ministry until his death, which took place on 30th December, 1730.

As a preacher he is ranked at the head of the French Protestants. He published five volumes of sermons, to which seven volumes were added after his death. His other chief works are, "On the State of Christianity in France," and "Discourses, Historical, Theological, and Moral, on the Principal Events of the Old and New Testaments," two vols. folio (known as Saurin's Bible), to which four volumes by other hands were added after his death. In these is contained the "Dissertation sur le Mensonge Officieux," in reference to a difficult passage in the first book of Samuel, chap. xvi., which occasioned many disputes and much trouble to the author.

SAUROPSIDA is one of the great divisions of the VERTEBRATA, including the two classes of REPTILES (Reptilia) and BIRDS (Aves). The term was introduced by Professor Huxley, who demonstrated the close relationship of these two classes. The main characters of the Sauropsida are as follows:—The skull articulates with the vertebral column by a single occipital condyle; the mandible is composed of several bones, and its articular portion is connected with the skull by means of the quadrate bone. The ankle-joint is between the proximal and distal row of tarsal bones. The body has an epidermic covering of scales or feathers, never of hairs. Respiration is by means of lungs throughout life. There is usually a single pair of aortic arches, but where one only persists (Birds) it is that of the right side; the heart is three or four chambered, and the red blood-corpuscles are nucleated. The alimentary canal and the ducts of the urinary and generative organs open into a common cloaca. All are oviparous or ovo-viviparous. The egg is large and contains much food material. The fetal membranes, the amnion and allantois, are present.

SAURURÆ, is an order of BIRDS containing only the fossil *Archæopteryx*, distinguished by the tail being composed of numerous free vertebrae, each carrying a single pair of feathers, and by the metacarpal bones not being ankylized together.

SAURY PIKE (*Scombresox*) is a genus of fishes belonging to the same family (*Scombræ*) as the *GARFISH* (*Belone*) and the *FLYING FISH* (*Exocoetus*). The saury pike has much resemblance to the garfish, the body being slender and covered with thin deciduous scales, the head elongated, and the jaws produced into a long slender beak; it differs, however, from that genus in having a number of detached finlets behind the dorsal and anal fins, and the teeth in the jaws are minute. The Saury Pike or Skipper (*Scombresox saurus*) is common on British coasts. It is from a foot to 18 inches long, dark blue above, white on the belly; the fins are dark brown in colour. The saury pike swims in vast shoals near the surface of the water. When pursued by porpoises or carnivorous fishes, they have the power of springing out of the water to the height of several feet, and traversing 30 or 40 feet in the air before they touch the water again. Shoals sometimes enter bays and are taken in great numbers. The flesh resembles that of the mackerel in flavour.

SAUSURE, HORACE BENEDICT DE, a Swiss naturalist, born at Conches, near Geneva, 17th February, 1740, and died at Geneva, 22nd January, 1799. He studied botany under his father and his uncle, Charles Bonnet, and under Haller, and became familiar with many sciences. From 1762 to 1786 he was professor of philosophy at Geneva, and in 1798, after the incorporation of that city with France, of natural history at the central school of the department of Leman, and he founded the society of arts in Geneva. He made important researches in the Alps and other mountains, contrived the best kind of hygrometer or rather hygroscope, and perfected and invented other instruments, the best known being the cyanometer. His "Voyages dans les Alpes" (four vols., 1779–96), comprising also his explorations of other mountains, gave him the title of the "first painter of the Alps."

SAUVEGARDE. See **TIGUEUX**.

SAVAGE, RICHARD, born 16th January, 1698, was the offspring of an amour between Lord Rivers and the Countess of Macclesfield. He was brought up in obscurity, sent to a small grammar-school near St. Albans, and afterwards placed by his mother with a shoemaker in London. Soon after this he became acquainted with the circumstances of his birth, and made many efforts to obtain an interview with his mother, who, however, resolutely refused to see him. At the age of eighteen he published a comedy called "Woman's a Riddle," and two years afterwards another, "Love in a Veil," both borrowed from the Spanish. These were failures, but he succeeded better with his tragedy of "Sir Thomas Overbury," in which he himself performed; and the profits of this play, and of a subscription raised for him at the time, produced a considerable sum. In 1727 his irregular habits of life led him into a tavern broil, in which he unfortunately killed a man, and for which he was tried and condemned to death. Intercession was made for him with the queen of George II. by the Countess of Hertford, and the royal pardon was granted, in spite of the efforts of his mother to prevent it.

The publicity given to the events of his life created much sympathy in his favour, and he soon afterwards obtained an annuity of £200 a year from Lord Tyconnel on the part of his maternal relations. At this time he published his longest poem, "The Wanderer," which was much admired at the time. His fair prospects, however, were soon afterwards clouded by a quarrel with his patron Lord Tyconnel, who accused him of ingratitude and banished him from his house. His acquaintance in consequence generally deserted him, and he sank again into obscure poverty. In despair of ever conciliating his mother, he published "The Bastard," which is by far the best of his works. The famous sneer at "the tenth transmitter of a foolish face" occurs in this powerful poem. After an unsuccessful attempt to obtain the situation of poet-laureate, Savage received from the queen a pension of £50 a year, as a reward for a poem in honour of her birthday, which his gratitude renewed annually from this time till her death in 1737, when the royal bounty was withdrawn from him. His friends then promised to continue the £50 if he would live quietly in Wales. In January, 1743, at Bristol, he was arrested for a debt of £8, and sent to prison in that city, where he died, 1st August, 1743.

The name of Savage has become better known than his merits deserve, from the singularity of his early misfortunes, and still more from the elaborate memoir which Johnson, the companion of his distresses, has inserted in his "Lives of the Poets."

SAVANNAH, a city and port of entry of Georgia, in the United States, situated on the south-west bank of the river Savannah, 17 miles from its mouth. The city is built on a sandy plain about 40 feet above the level of the tide. The streets cross each other at right angles, and many of them are wide and bordered with trees; the town has the form of an elongated crescent, and extends about 3 miles along the river. Its streets are wide, well-shaded, and intersected by numerous small public squares or parks. It has a Roman Catholic cathedral and numerous churches and chapels, a custom-house, exchange, armoury, medical college, and a fine park. It is connected with the principal railways, and the harbour has a depth of 19 feet at low water. The population in 1880 was 30,681. The town was founded in 1733, by General Oglethorpe, and was captured in 1779 by the British forces, who held it till 1782. In 1789 it was incorporated. It suffered greatly during the Civil War, but since then it has steadily increased in prosperity. John and Charles Wesley lived here and in Charleston in 1733.

SAVANNAHS or **SAVANNAS** (from the Spanish *savana* or *sabana*), the name given by the early Spanish

settlers to the vast rolling prairies and apparently boundless pastures of the American continent.

SAVIN (*Juniperus Sabina*), a low evergreen shrub, somewhat like the common juniper, flourishes in Alpine districts of Central and Southern Europe. In the Alps it is found up to 5000 feet, while in the Caucasus it grows at an elevation of 12,000 feet. It is a native also of the Altai Mountains, of Siberia, Newfoundland, and the borders of Canada and the United States. Its leaves when rubbed give forth a strong, pungent, and peculiarly unpleasant odour. Its berries are small and black, but covered with bluish bloom. From the tops of its branches, which are gathered in the spring and dried, a volatile oil is obtained which is limpid, almost colourless, acid, and a strong irritant. The oil is used in cases of amenorrhœa and chlorosis, from its stimulating effect on the uterine organs, and has been employed for the purpose of procuring abortion. But if given in such quantities as to have this effect it becomes poisonous, and is generally attended with fatal consequences. As an ointment it is sometimes used externally to keep up the discharge from a blistered surface. Savin is mentioned by Dioscorides and Pliny, and in English books before the Norman Conquest. Charlemagne ordered it to be cultivated in Central Europe.

SAVINGS BANKS. The habit of laying something by in a prosperous season for the wants of an adverse one is inculcated in the teachings of a very remote antiquity. In England in almost everything relating to the social advancement of the industrial population, there has been a great and manifest improvement since the commencement of the present century, and in nothing is this more true than in the incentives and appliances provided for the growth of provident habits. Not only have the savings of the people assumed a variety of different forms, but they now represent a sum which in the aggregate seems wonderful when compared with the early part of the present century. It is true there is yet room for very great improvement, as unhappily the stigma of improvidence may still be fairly laid to the charge of a majority of the English artisan class, and but for which drawback there would be no operatives in the world equal to them either in wealth, intelligence, or influence. Nothing has contributed more to the beneficial change which has been effected than the almost universal establishment of savings banks—institutions which may with justice be said to have originated in Great Britain. The first proposals for a bank for savings were made in 1798 by the Rev. Joseph Smith of Wotton, Bucks, who offered to receive from any inhabitant of his parish any sum, from 2d. upwards, every Sunday evening during the summer months, to keep an exact account of the money deposited, and to repay at Christmas to each individual the amount of his deposit, with the addition of one-third to the sum as a bounty upon his or her economy. In the following year Mrs. Priscilla Wakefield of Uxbridge, Middlesex, started a scheme for the benefit of women and children in her own village. In 1808 a society was formed in Bath, managed by eight individuals, four of whom were ladies, who received the savings of domestic servants and allowed interest at the rate of 4 per cent. Other banks of a somewhat similar character were shortly afterwards established in different parts of the country, but they all partook, more or less, of the character of charitable institutions, depending for their interest and maintenance chiefly on the support of the rich, and therefore calculated to weaken the feeling of independence on the part of the depositors, and altogether unsuitable for districts where benevolent rich persons did not reside. In 1819 the Rev. Henry Duncan, of Bolton, in Scotland, established a Parish Bank Friendly Society, which more nearly resembled the present savings banks than anything which had preceded it. He published a prospectus of the institution with the hope of promoting

similar establishments elsewhere; and it is doubtless due principally to him that in 1817 there were seventy savings banks established in England, four in Wales, and four in Ireland. The great features of these banks were, that nearly all of them were self-supporting, and did not partake of the nature of charities. In the year last mentioned (1817) legislative provisions were first made for their management, and the Acts 57 Geo. III. c. 105 and 130 were passed for encouraging the establishment of banks for savings in England and Ireland respectively. By these Acts the trustees and managers were prohibited from receiving any profit or advantage from the institutions, and were required to enrol the rules of their institutions at the sessions. A fund was established in the Office for the Reduction of the National Debt in London, entitled The Fund for the Banks for Savings, and to this fund the trustees were bound to transmit the amount of all deposits that might be made with them when the sum amounted to £50 or more. For the amount so invested the trustees received a debenture, carrying interest at the rate of 3d. per cent. per diem, or £1 11s. 3d. per cent. per annum, payable half-yearly. The rate of interest then usually allowed to depositors was 4 per cent., the difference being set aside to defray working expenses. In Ireland the depositors were restricted to the investment of £50 in each year, and in England the same restriction was imposed, with a relaxation in favour of the first year of a person's depositing, when £100 might be received. It having been ascertained that banks for savings were being used by persons for whom they were not intended by the legislature an Act was passed in 1824 which restricted the deposits to £50 in the first year of the account being opened, and £30 in each subsequent year, and when the whole should amount to £200, exclusive of interest, no further interest was to be allowed.

In 1836 a further Act was passed, and a still more important one in 1844. Both were, however, consolidated and amended in 1863 by the 26 & 27 Vict. c. 87, and the existing law relating to savings banks is mainly as follows:—In order that a bank may have the benefit of the law, a book containing the rules and regulations of its management must be accessible to depositors at all reasonable times. No person having control over the management of the savings bank must derive any benefit from deposits made in it, further than by salary, or the payment of necessary expenses, in accordance with its rules. On all occasions of public business at least two persons appointed for the purpose must be present, so as to form a double check; and if there are not more than two, one of them must be as trustee or manager—except in cases of savings banks open for more than six hours every week. The depositor's book must be compared with the ledger on every transaction of repayment, and on being first produced at the bank after the 20th of November, and each depositor must, at least once a year, deliver his book for examination. No money must be paid except at the places and within the hours authorized by the rules. The accounts of the bank must be audited every half year, and a report made to the board or committee of management regarding its assets and liabilities. Each savings bank must transmit to the Commissioners for the Reduction of the National Debt a weekly account of its transactions, and the amount of cash balance in the hands of any one on account of it. Friendly societies, legally enrolled or certified, may invest any sums belonging to them in a legally established savings bank. Persons when depositing must make a declaration that they have no deposit in another savings bank, unless as executors, &c.; and those who make this declaration falsely forfeit any deposit they have made and all right to deposit in future. More than £30 is not to be received from any one depositor in a year, nor, on the whole, more than £150, exclusive of interest.

nor than £200, including interest—in which latter case interest is to cease. If the money belonging to a deceased depositor is more than £50 it is not to be paid until after probate of the will or letters of administration have been obtained. If it is less than £50 it may be paid on a certificate obtained from those having power to grant probate or letters of administration. Legal documents required for the purposes of savings banks are free of stamp duty. Depositors' books must contain a copy of the rules. The Commissioners for the Reduction of the National Debt furnish Parliament annually with the particulars of their transactions in regard to savings banks and to the surplus funds in their hands. Interest in savings banks is computed to 20th May and 20th November each year.

Under the Savings Bank Act of 1863 trustees have to invest the depositors' money with the National Debt Commissioners, and the latter had to allow interest at the rate of £3 5s. per cent. The trustees in turn allowed depositors interest at the rate of about £3 per cent., the margin being for expenses of management. The $3\frac{1}{2}$ per cent., however, exceeded the interest which the National Debt Commissioners could themselves obtain for the money they received, and they were thus involved in a large annual loss, the total of which was found in 1879 to amount to £4,150,000. It was feared that any diminution of interest would lessen inducements to thrift; and Sir Stafford Northcote, perhaps hesitating also to face the unpopularity of such reduction, proposed that Parliament should grant annually the deficit of the previous twelve months. This course, which was really a direct bounty to the banks, did not accord with the financial views of Mr. Gladstone; and on his accession to power in 1880, he at once decided to reduce the interest to the amount the commissioners could afford to pay, and to wipe off the accumulated deficiency by terminable annuities. By the Savings Bank Act of 1880 these objects were effected, the sum payable by the commissioners being reduced to 3 per cent., while the interest paid by the trustees is not to exceed £2 15s. per cent. per annum. Even this reduced sum is more by 5s. per cent. than the interest allowed in the Post Office Savings Banks.

Statistics of Savings Banks.—The following statistics, compiled from official tables, give the most complete information which can be obtained with regard to savings banks, and show at a glance their steady rise and progress:—

Table I. showing the amounts invested in Savings Banks with the National Debt Commissioners, from 1817 to 1840, with the total capital of all the Banks at the end of each period given.

Year Ending 20th November.	Total Amount Credited to Trustees, Including Interest.	Total Capital at the Close of each Year.
1817	£231,028	£231,028
1820	807,825	3,469,910
1830	1,056,584	14,860,188
1840	1,949,126	23,549,716

Table II., showing the amount of Deposits and Withdrawals, and the Capital of Savings Banks, from 1850 to 1885.

Year Ending 20th November.	Deposits.	Withdrawals.	Capital of Savings Banks in the United Kingdom.
1850	£6,363,690	£6,760,828	£28,930,982
1860	9,478,585	8,258,421	41,238,368
1870	7,571,667	8,167,783	37,958,549
1880	9,008,315	10,076,557	43,976,447
1885	9,805,707	10,507,289	46,355,909

A new era in the history of savings banks was inaugurated in 1861 by the establishment of the sister system of post-office savings banks. The details of which have been given in the article *POST-OFFICE*, but it may be added here that the deposits there, at the end of 1885, amounted to nearly £18,000,000, making a total of over £94,000,000 in both kinds of savings banks.

MILITARY SAVINGS BANKS were first instituted in 1842, owing to the indefatigable exertions of Sir James McGregor. All the Acts of Parliament relating to them are now consolidated in the 22 & 23 Vict. c. 20. The amount which any one in the service can deposit is unlimited, though interest is not allowed on any excess over £30 in one year, except in the case of gratuities given for good conduct. When the sum of £200 is reached no further interest is paid. The interest must not exceed $3\frac{1}{2}$ per cent. The whole of the money deposited is transmitted to the secretary at war, who has an account with the National Debt Commissioners, which is kept separately from the ordinary savings bank account. Returns of all the transactions are annually laid before Parliament.

NAVAL SAVINGS BANKS.—What was done for soldiers in 1842 was accomplished for seamen in 1854. These banks are under the direction of the Board of Trade, which has power to constitute any shipping office established under the Merchant Shipping Act a branch bank under its control. The money invested in these banks is paid through the Board of Trade to the National Debt Office, and interest allowed similar to that given by ordinary savings banks. An annual statement is laid before Parliament of all transactions.

PENNY BANKS.—A brief description of these useful and interesting institutions will not be out of place in this article. As before stated, something of the kind was one of the features of Mrs. Wakefield's Tottenham bank in 1801, and before 1850 there were four such banks established. The first was started in Greenock in 1817 by Mr. Scott, a native of that town. The Greenock Savings Bank, like all others, restricted the amount that could be received to a shilling, and very few of them taking that amount pleasantly, Mr. Scott thought that the poor had no safe place in which to deposit their little surplus earnings. He accordingly started a Penny Bank to receive such small sums; and to show how much it was needed, in the first year of its existence there were 5000 depositors, and the amount invested was about £1600. The success of this bank was such that many private establishments and charitable institutions were not long in following the example that had been set, and in the following year a penny bank, established by the Rev. Mr. Queckett, incumbent of Christ Church, St. George's-in-the-East, London, received no less than 15,000 deposits. The Birmingham Penny Bank was established in 1851, and in six years from its commencement had received the large sum of £52,354. There are no means of obtaining statistics as to the number of Penny Banks, but there cannot be less than 100 large ones in different English towns, besides an incalculable number connected with private establishments, ragged and other schools, and different religious bodies. An extension of the movement was carried out in 1875-76, by the institution of a National Penny Bank under the auspices of Mr. Brassey and several other well known names; and in the Metropolis and Yorkshire more particularly, this very convenient kind of bank has in late years largely multiplied. In Scotland the movement has progressed more rapidly even than in England, and the penny bank system flourishes in Glasgow to an extent unknown in any other neighbourhood—there being nearly a hundred banks in operation. The Post Office Savings Bank has also practically been a penny bank since 1880; in that year a plan was introduced of issuing forms gratuitously at every post office, on which twelve penny stamps may be affixed, which is taken as a shilling deposit.

In France the savings banks are under the surveillance of the state, and their funds are deposited in the *caisse des dépôts et consignations*, which is administered under guarantee of the public treasury, which pays the interest; but the depositors have no other security than the banks themselves. The earliest savings bank established in France was in Paris, 29th July, 1818; there was one in Bordeaux in 1819, and one in Marseilles in 1821; these were joint-stock companies. Generally from 1821 they have been municipal institutions established by the town councils. In Belgium savings banks exist in most of the principal towns, and are under the direction of the towns themselves or of financial establishments. Switzerland has long been famous for its savings-banks. In 1874 it had 303, with deposits amounting to 57,600,000 dollars. In the various states of the German Empire savings banks exist, one having been founded in Berlin as early as 1818. In the United States the first savings bank was the Philadelphia Saving Fund Society, suggested by Condé Rague and organized in 1816. It still exists in a flourishing condition. The second was established in Boston in the same year; the third in New York in 1819. In the various states there are laws regulating these institutions, and some of them are managed with great probity and have been eminently successful, although there have been very disastrous failures.

SAVOIE, a department in the south-east of France, on the Italian frontier, forms part of the old Sardinian province of SAVOY. It is surrounded by high mountains, and bounded by the departments of Hautes Alpes, Isère, and Haute Savoie. The area is 2224 square miles, or about 112,000 acres, and the population in 1881 was 266,138.

The surface forms two valleys, which are watered by the Isère and its tributary, the Aïve. In the north-west is the Lake of Bourget (5 miles from Chambéry), which is 10 miles long and 3 miles wide, and is 799 feet above the sea. Timber and slate are brought from the mountains, but the inhabitants are mostly employed in cattle-rearing, silkworm breeding, and the cultivation of grains and vines. Some very good wine is made. The manufactures comprise hquacs, leather, paper, earthenware, &c., but they are not very important. The department is traversed by the railway from Culoz to Mont Cenis, which stops at St. Michael.

Savoie is divided into the four arrondissements of Chambéry, D'Albertville, Moutiers, and St. Jean-de-Maurienne. The chief town is CHAMBÉRY.

SAVOIE, HAUTE, is a department between those of Ain and Savoie, in France, and separated on the other sides by the Lake of Geneva from Switzerland. Its area is about 1667 square miles, and the population in 1881 was 271,987.

Surface. Soil, &c.—The surface is nearly covered by ramifications of the Alps, which form several valleys, the principal being that of the Aïve. On the south-east border is Mont Blanc, which separates Haute Savoie from the val de Aosta. The department is wholly comprised in the basin of the Rhone, which river forms its boundary on one side. In the south is the Lake of Annecy, which is 9 miles long by 2 miles broad, and is 1426 feet above the sea. The occupations of the inhabitants are very similar to those in SAVOIE, besides which poultry and bees are extensively reared, and some cheese-making is carried on. There are also many large mines, which afford employment to considerable numbers.

The department is divided into the four arrondissements of Annecy, Bonneville, St. Julien, and Thonon. The capital of the department is ANNÉCY.

SAVONA, a seaport of Italy, situated on the west shore of the Gulf of Genoa. It has a safe harbour for small vessels, and a considerable trade. Savona had a population of 29,614 in 1881. The streets are narrow

but well built, and present a scene of much activity. The principal buildings are the cathedral, the Sistine chapel, and near it the Dominican church; the towers on the port, one of which is surmounted by a colossal statue of the Virgin; and the palaces of the resident proprietors of the surrounding country. The churches are adorned with numerous fine paintings. The railway to Turin has added considerably to the prosperity of Savona. The road from Savona to Genoa, which runs close to the shore, here tunnelled through the rock, there supported by terraces, is one of the gayest and most cheerful roads in the world. Thronged with vehicles of every description, and travellers both mounted and on foot; bordered with the streets of towns, with villages, villas, palaces, or gardens—it presents the aspect of a great and prosperous suburb up to the very gates of Genoa the Proud.

Savona was the birthplace of Pope Sixtus IV. and Julius II., and is said to have been for some time the residence of Columbus. Pope Pius VII. was detained in it in 1810–11, by order of Napoleon.

SAVONAROLA, GIRO' LAMO, an eminent Italian monk, and one of the precursors of the Reformation, was born at Ferrara on the 1st of September, 1452. He was descended from a family of noble lineage, originally resident at Madrid. His father intended him for the medical profession, but Savonarola, when twenty-three years of age, secretly quitted home, and in the expectation of enjoying a life of purity and tranquillity joined a Dominican fraternity at Bologna. He soon found his mistake, and revolted by the licentiousness and corruption on every side, withdrew himself into strict retirement, and prosecuted in solitude his scriptural studies. At the solicitation of his superiors he next made an attempt at public preaching. His first efforts were failures; but he was not a man to be readily baffled, and conquering his defects of manner and articulation by constant practice in private, he made a second essay in the pulpits of Brescia, and with complete success. The people were startled, not only by his eloquence, but by his evident sincerity. His fame daily spread, and his excellence as a preacher constantly augmented, until, about 1489, he was invited by Lorenzo de' Medici, better known as Lorenzo the Magnificent, to take up his abode at Florence. There he attached himself to the great Dominican convent of San Marco, and began that career of influence and usefulness which has handed down his name to posterity. In 1491 he was appointed prior of the convent, and in this new capacity purified the establishment of all its stains, endeavouring to inspire the monks, by his own example, with a love of truth, chastity, meekness, and self-denial. He now became a power in Florence, and, indeed, throughout all Italy, which rang with his vehement denunciations of the corrupt and debauched court of Rome. Nor did he spare the government of Lorenzo; who, however, was of too noble a character to reverence him the less for his honesty, and who received from him when dying his farewell benediction. In the interregnum of confusion and tumult that followed Lorenzo's death, Savonarola showed himself as anxious for his countrymen's liberties as for their spiritual well-doing. When Charles VIII. of France arrived with his army before Florence, Savonarola went out to meet him, boldly reproved him for his vices, and admonished him from the pages of the Bible to govern justly and mercifully. Charles was overcome by his eloquence, and withdrawing his troops, left the Florentines undisturbed to choose their own form of government.

For a while Savonarola's spirit and example seemed to infuse a new life into the city. Aided by an association nicknamed the *Piagnoni* (Weepers), abuses of the state were rooted out; monastic institutions reformed; educational advantages were extended to the lower classes; everywhere order, morality, and respect for the law pre-

vailed. But the Pope was ill-pleased with a reformation that contrasted so strongly with the church's condition, and summoned the reformer to appear at Rome. Supported by the Florentines he disregarded both the threats and the promises of the pontiff; and it is even possible that he might have closed his career in peace, but for some excesses of intolerance and fanaticism into which his impetuous spirit now betrayed him. As with all puritanic states, the dreariness and ugliness which grew up when all beauty and elegance had been denounced as sinful, ended by clouding from the people the inner beauty and majesty of puritan life, and by driving them towards a fatal reaction on the side of liberty even to license. The party of the Medici slowly increased in numbers as that of Savonarola was diminished by his want of policy; and the Roman court, gathering courage, launched at him an excommunication, which was not without effect upon the minds of the ignorant and superstitious (1497). The magistracy still supported him, but attacked by a fanatical Franciscan friar named Francesco da Riglia, intrigued against by the clergy, and deserted by the multitude, he fell. He was arrested in the convent of San Marco, tortured, thrown into prison, and, after a month's captivity, sentenced, as one guilty of heresy and seditious teaching, to be first strangled and then burnt. His execution took place on the 23rd of May, 1498, and his ashes were cast into the Arno. He betrayed no signs of doubt or fear on the scaffold, and bade his friends continue steadfastly in his doctrine, and live in peace.

Savonarola was a man of remarkable natural powers, and in most respects in advance of the age in which he lived. Though aware of its corruptions, he was still a devout adherent of the Church of Rome. He denounced the vices of his time, but shared many of its superstitions. His eloquence was fervid, his sincerity unquestionable, but an impetuous temper and iron will often plunged him into serious errors.

The works of Savonarola are very numerous. They are all composed in Latin or Italian, but translations have appeared in the principal European languages. Those which will best repay the trouble of the student are—in Latin, "On the Simplicity of the Human Soul," "On the Perfection of the Spiritual Life," "The Triumph of the Cross;" and in Italian, "On the Love of the Saviour," "On Humility," "On Prayer," and "Rules of Christian Living." A handsome monument to Savonarola was erected at Florence in 1870.

Villari's life of Savonarola is one of the best biographies of this generation (Florence, 1859; English translation, London, 1863). Other works giving the career and character of this enthusiastic reformer are Madden's "Life of Savonarola" (1854); Roscoe, "Life of Lorenzo de' Medici;" Abbé Carle, "Histoire de Fra Hieron. Savonarola;" and Sismondi, "Histoire des Républiques Italiennes" (1812). The portrait of Savonarola by his friend Fra Bartolommeo (now at San Marco) is a masterpiece of delineation; and no less full and striking is the account of his character and chief work given by George Eliot in "Romola."

SAVOY (Ital. *Savoia*), formerly a division of the kingdom of Sardinia, was annexed to France in 1860, and is now divided into the two departments of SAVOIE and HAUTE SAVOIE.

The people of Savoy, who speak a mixed dialect of French and Italian, have an old established reputation for honesty, loyalty, and bravery.

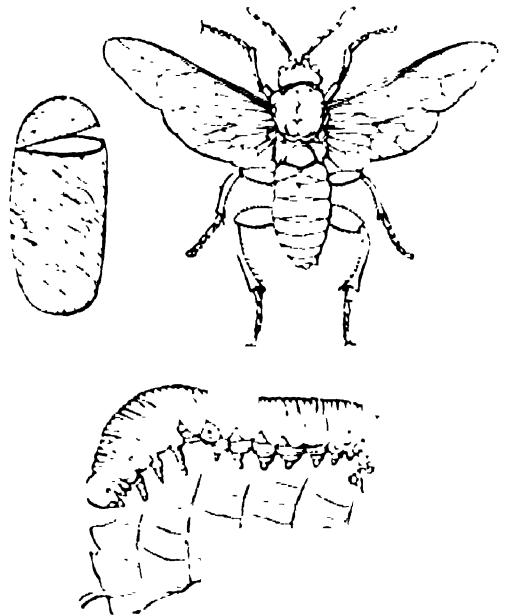
The history of the ducal and princely house of Savoy is given in the article SARDINIA.

SAWFISH (Pristidae) is a family of plagiostomous fishes belonging to the suborder Batoidei or RAYS. The sawfishes have the elongated and rounded form of the sharks, but in the ventral position of the gill openings, and

the absence of an anal fin, they agree with the true rays. They are distinguished by their long, flattened, narrow snout, which is armed along each edge with a series of strong teeth, forming a double-edged saw. The body is depressed and elongated, with a strong muscular tail. The pectoral fins do not extend in front to the head. There are two dorsal fins without spines, the first placed opposite or close to the base of the ventrals. The jaws are armed with minute obtuse teeth.

Five species of sawfishes are known, most abundant in tropical and subtropical seas. They are powerful swimmers. The Common Sawfish (*Pristis antiquorum*), which is found in the Atlantic and Mediterranean, and was known to the ancients, is from 12 to 15 feet long, of which the saw forms a third. The saws are formidable weapons, being used for tearing or ripping up their prey. Sawfish are said to attack and kill whales with this weapon, and it has been found driven into the timbers of ships. In some species the saw is as much as 6 feet in length.

SAWFLY (Tenthredinidae) is a family of hymenopterous insects, distinguished by their short cylindrical body, short antennae, broad head and thorax, and abdomen closely united to the thorax. The ovipositor of the female consists of two saw-like blades lodged in a groove in the abdomen within two sheaths. With this saw the female cuts slits in the leaves and shoots of trees and plants and deposits in each slit an egg. The irritation caused by the wound brings about an increased flow of sap to that part, and in some cases leads to the production of galls. Some species merely attach their eggs to the outer surface of leaves. The larvae are very like the caterpillars of butterflies and moths. In addition to the three pairs of thoracic legs, they have generally from six to eight pairs of abdominal legs. They are usually green in colour, with various markings. When full grown they spin a tough cocoon,



Cimbex (larva and cocoon).

which is either attached to leaves or twigs or placed underground; within this they pass the winter, change to pupae, and emerge in spring or early summer as perfect insects.

Most of the species are inhabitants of the temperate zone; over a thousand species have been described, many of which are British.

The Gooseberry Sawfly (*Nematus ventricosus*) is most destructive on gooseberry and currant bushes in the larval

state. It is a small species, about a quarter of an inch long, reddish-yellow in colour, with the head and thorax black in the male, the head alone black in the female. The larva is pale green, with the head, feet, and extremity of the abdomen black, and the whole body spotted with black. This species has been imported into North America from Europe, and has done great injury. Some species of *Nematus* produce galls in willows. The larva of the Turnip Sawfly (*Athalia spinarum*) feeds on the leaves of turnips and other cruciferous plants; it is sometimes very destructive to the turnip crops in this country. The larva is nearly black, and is known by the names Black Jack and Nigger. The perfect insect is about a quarter of an inch long, reddish yellow, with the head and the sides of the thorax black. The Pine Sawfly (*Lophyrus pinus*) is very destructive to the pine and fir, and another species of the same genus does great injury to coniferous trees in North America. Two other sawflies are found on the pine, *Lyda pratensis* and *Lyda campestris*, the larvæ of which are social; another species of *Lyda*, *Lyda betula*, is very common on the birch. The Rose Sawfly (*Hylotoma rosarum*), which attacks roses, has only three joints to the antennæ. To the genus *Selandria* belong several of the most destructive larvæ, attacking the pear, vine, &c. The antennæ in the genus *Cimbex*, which contains the largest species of the family, are club-shaped at the end, and the hind legs in the males are very much thickened in some of the species. Several species are indigenous to this country. Dr. Harris describes the cimbex of the elm (*Cimbex umia*), a common American species, the larva of which feeds on that tree. When full grown these larvæ are from 1 to 2 inches in length. When they have done feeding, the larva conceals itself under fallen leaves or other rubbish, and there makes an oval brown cocoon, which is as tough as parchment. In this cocoon, which is about an inch long, the caterpillar remains throughout the winter, and is not changed to a chrysalis till spring. The insect escapes by gnawing a circular piece off the end of the cocoon.

The Corn Sawfly (*Cephus pygmaus*) belongs to a nearly allied family, *Proctidae*, or Tailed Wasps. It attacks different kinds of cereals, the larvæ eating the interior of the stems. When full grown the larva descends to the base of the straw, and spins itself a cocoon, in which it passes the winter.

SAWTREY, SIR WILLIAM, the first Protestant martyr in England, was not a knight but a clergyman, certain clergymen being in the fashion of the time styled "Sir." The reason of this was probably that if university men were called "Mister" the degree of M.A. would seem to be implied; therefore those priests who had not graduated, but yet were in order, were called "Sir;" so that, as old Fuller says, "there are more sirs than knights in England." (Compare also Shakspeare's persons, Sir Hugh in 'The Merry Wives,' Sir Over in 'As You Like It,' Sir Topas in 'Twelfth Night,' and Sir Nathaniel in 'Love's Labour's Lost'.)

The cause of the great Protestant movement, headed by the famous Wycliffe, and popularly called that of the LOLLARDS, which occurred at the close of the fourteenth century, is described in the article of that name; and it is there stated how Henry IV., immediately after his accession, bought the support of the orthodox church by the fearful burning statute, the *De Heretico Comburendo* (1409). The first victim of this awful statute was the subject of this article; and it must be remembered that Sawtrey, the first person burned for religion's sake in England, suffered considerably more than a century before Luther began his Reformation.

William Chatrys (pronounced Sawtrey) had been parish priest of the parishes of St. Margaret's, King's Lynn, and Tynney, in Norfolk. Monkish zealots, writing after his

death, have falsely blackened him as a licentious man and a profligate; but there is no hint of this in the many and minute charges brought against him in Convocation. By his own confession we know that he did sometimes omit to say his matins and his hours in order to hear confessions and to celebrate the mass, or to give the time to study and prayer; and that he had often sanctioned the abandonment of vows of pilgrimage, if commuted into sums of money to be distributed among the poor. He fell into the new Lollard opinions, and soon came under the notice of Bishop Spenser of Norwich. Being charged with heresy, and "diverse felonies and treasons," he was convicted and condemned to death; but he publicly recanted at Lynn, and received a full pardon from the king (6th February, 1400). After this he removed to London, where he became chaplain of the parish of St. Osyth, Walbrook. Here his conscience would not let him rest; but he taught and preached, openly and secretly, the same or similar opinions to those which he had previously denounced as heresy. He was now called to answer before Convocation, and on Saturday, 12th February, 1401, was charged with having taught the following eight dangerous propositions:—

(1) That he would not adore the cross on which Christ suffered, but only Christ who suffered on it; (2) that he would rather bow to a temporal king than a wooden cross; (3) that he would rather honour the bodies of saints than the true cross, supposing it were before him; (4) that he would rather worship a man confessing and repentant than the cross of Christ; (5) that he was more bound to worship a man whom he knew to be predestined than an angel of God; (6) that if any one has made a vow to visit the holy places at Rome or Canterbury, or anywhere else, to obtain some temporal benefit (e.g. to be cured of some disease or to secure some property), he is not bound to fulfil his vow literally, but may spend his money on the poor; (7) that any priest or deacon is more bound to preach the Word of God than to say the hours; (8) that after the words of consecration in the Eucharist the bread remains bread, and nothing more.

He was found guilty on all the counts, and was burned at the stake in Smithfield on 26th February, 1401.

SAXE-ALTENBURG, a small duchy of Central Germany, on the northern frontiers of the Thuringian Forest, consists of two principal divisions, separated by the territory of Renss—the eastern lying along the Pleisse, and the western along the Saale. The area is 509 square miles. The climate is mild and salubrious. The country is hilly, richly wooded, and fertile. In the west the surface is covered by ramifications of the Erzgebirge Mountains. The rivers, which are very inconsiderable, and all tributaries to the Elbe, are the Saale, Orla, Roda, Pleisse, Sprotta, and Gerstenberg. There are several large lakes and also mineral springs, the most celebrated of which is that at Ronneburg. Agriculture and grazing are skillfully conducted. Sheep, horses, swine, wild boars, and deer abound. There are but few minerals. Iron mines, however, are worked in the vicinity of Ronneburg, and the extensive peat-fields near Altenburg yield abundance of fuel. A fine porcelain earth is also found in the neighbourhood of Altenburg, which supplies the works at Gotha. Manufacturing industry is chiefly confined to woollen cloths, stockings, and wooden wares. The articles of export are corn, cattle, wool, butter, and timber.

The population was estimated in 1883 at 155,000, rather more than half of whom are Wends (German Slavonians). The inhabitants profess the Protestant religion. The Slavonic customs and dress still prevail in the rural districts, although the dialect has disappeared since the middle of the sixteenth century. The peasants are reputed to be more wealthy than in any other part of Germany, and the rule prevails among them of the youngest son becoming the heir to the landed property of the father.

Saxe-Altenburg, after numerous changes of masters, was formed into a separate principality in 1603. On the extinction of the house of Altenburg in 1672 the larger portion reverted to Ernest the Pious, duke of Gotha. From this period the principality was governed by the family of Saxe-Gotha, till it expired in the person of Frederick IV., in February, 1825, since which time it has been held by the family of Hildburghausen. The duchy now forms a portion of the German Empire. The constitution bears the date 29th April, 1831, but was altered on 1st May, 1857. It vests the legislative authority in a chamber composed of thirty representatives. The revenue and expenditure are each about £125,000. About one-half the revenue is derived from the state domains. **ALTENBURG** is the capital.

SAXE-COBURG-GOTHA, a duchy in the old district of Saxony, and the third in point of size of the minor Saxon states, is composed of two large and various smaller detached portions, which are surrounded by the territories of Prussia, Schwarzburg, Sonderhausen, Weimar, Meiningen, and Bavaria. The area of Coburg is 230 square miles, that of Gotha 586; making a total of 816 square miles. The country, though occasionally level, is on the whole of a mountainous character, being traversed by the Thuringian range. In the plains and valleys the climate is mild and salubrious, but in the mountains rather inclement. The rivers, which are tributaries of the Main, the Weser, and the Saale, are the Ilz, Steinach, Rodach, Nasslach, Honsel, Emse, Ruhl, Nessa, Unstrut, Gera, and Apfelstedt.

The duchy contains many fertile valleys, and agriculture is the principal occupation of the inhabitants. Corn and flax are produced in abundance, as are also potatoes and leguminous plants. The forests yield timber, potash, and pitch. The rearing of live stock is prosecuted with much activity. Iron is found near Friederichs-stadt; there are also coals, sandstone, millstones, marble, alabaster, gypsum, lime, potter's clay, porcelain earth, and salt. There is considerable manufacturing industry in Gotha, but little in the other districts. Besides a fair amount of export business the duchy has a considerable transit trade, as the high road from Leipzig to Frankfurt passes through it. The estimated population of Saxe-Coburg-Gotha in 1883 was 198,607, nearly all Lutherans. The only towns of importance are Coburg and Gotha.

Coburg formerly belonged to the Counts of Henneberg, but came by marriage into the Ernestine branch of the house of Saxony. On the death of the Elector John Frederick, this petty territory was contended for by many branches of the Saxon family; and it was not till 1825 that the existing arrangement was made, whereby, on the territorial division of the duchy of Gotha-Altenburg, Coburg resigned its possessions on the left bank of the Steinach in exchange for the principality of Gotha, with the exception of a few small districts: it also obtained Königsberg, Sonnefeld, Kahlenberg, and Gauerstadt. The duchy now forms part of the German Empire.

The civil list of the duke is about £15,000 per annum. The total public revenue is about £150,000 per annum. The Staatsgrundgesetz or fundamental law of the duchy was proclaimed on 3rd May, 1852. The crown is vested in Duke Ernest II. and his descendants, or failing these the children of his brother Albert, the late Prince Consort of Great Britain. Excluded from the throne, however, are the sovereign as well as the heir-apparent of Great Britain, so that the next duke will be the Duke of Edinburgh. The legislative power is vested in two separate assemblies, one for the province of Coburg and the other for that of Gotha. The Coburg Chamber consists of eleven, and that for Gotha of nineteen members, chosen in as many electoral divisions by the direct vote of all the inhabitants. Every man above the age of twenty-five who pays taxes has a vote, and any

citizen above thirty may be elected a deputy. New elections take place every four years. The two assemblies meet separately every year; and every second year they unite into one chamber, to which the Coburg Diet deputed seven, and that of Gotha fourteen members. The United Parliament meets alternately at the towns of Coburg and Gotha, and has to decide all legislative measures bearing upon questions affecting the whole duchy, while the provincial assemblies occupy themselves with affairs of a more local nature.

SAXE-MEININGEN-HILDBURGHAUSEN, a duchy of Central Germany, composed of the ancient duchy of Meiningen and the principalities of Hildburghausen and Saalfeld, which (with the exception of a few districts) form one compact territory, extending in a semicircle along the banks of the Werra, and skirted by the chain of the Thuringian Forest. The duchy has an area of 933 square miles, with a population estimated in 1883 at 211,571.

The surface is covered with the Thuringian Forest Mountains, whose loftiest point is the Blätzberg, 2760 feet high. The valleys supply rich pasturage for numerous flocks and herds; they also contain many curious caverns, of which the most remarkable are the Zinselloch, the Griebisch, and the Altensteinerhohe. About two-fifths of the country are arable land, and so well is agriculture pursued that sufficient corn is produced for home consumption. Potatoes, hemp, flax, and tobacco are the other chief crops.

The principal rivers are the Werra, which traverses the duchy, the Saale, Ilz, Rodach, Milz, and Steinach. There are mineral springs near Liebenstein and Salzungen, and salt springs near Friedrichshall and Neusulza. The minerals are various and abundant—iron, cobalt, copper, coal, alum, vitriol, marble, porcelain clay, and salt being obtained; and although grazing and agriculture are the chief employments of the inhabitants mining is actively pursued. In some districts there are many furnaces, mills, and glass-houses. The ordinary manufactures are coarse linens, sail-cloth, woollens, cottons, porcelain, and hardware; there are also distilleries, breweries, and tanneries. The wooden toys and musical instruments made in this duchy, especially at Sonneberg, are largely sold in England.

Meiningen, besides its joint right in the University of Jena, has gymnasia at Meiningen and Hildburghausen, and numerous public schools. The population of the duchy and its dependencies in 1881 was 196,000, nearly all of whom are Protestants.

The public revenue is about £250,000 per annum, nearly one-half of which is derived from the state domains, formerly belonging to the ducal family. The charter provides for a legislative organization, consisting of one Chamber of twenty-four representatives. Eight of these are elected by the proprietors of the more highly taxed estates, eight by the inhabitants of towns, and eight by those of rural districts. The Chamber meets every three years, and new elections take place every six. A small property qualification is requisite to become a member.

The duchy of Saxe-Meiningen formerly constituted a part of the domains of the Counts of Henneberg, but it was governed as a separate state by the descendants of Ernest the Pious, duke of Gotha, from 1680 to 1825. On the extinction of the house of Saxe-Gotha-Altenburg, in the latter year, Meiningen received a considerable accession of territory in the principalities of Hildburghausen and Saalfeld. The duchy now forms an integral part of the German Empire.

Hildburghausen was founded by Ernest, sixth son of Ernest the Pious, in whose family it continued till 1826, when, by a family compact among the junior ducal houses, the reigning Duke Frederic exchanged it for the duchy of Altenburg. Since that period it has merged into the duchy of Meiningen, with the exception of a few districts which were ceded to Coburg.

SAXE-WEIMAR-EISENACH, a grand duchy in Central Germany, on the northern frontiers of the Thuringian Forest, consists of the two principalities of Weimar and Eisenach, which are separated by Saxe-Gotha, and of the insulated district of Neustadt, besides various detached portions. The area is 1421 square miles.

The surface is mountainous in the west, but more level in the centre and east; and being well watered the soil is for the most part adapted to agriculture, which is in an advanced condition and diligently prosecuted. The climate is rather inclement in the mountains, more temperate in the plains, and particularly pleasant along the valley of the Saale. The principal rivers are the Saale, Ilm, Elster Orla, Unstrut, and Gera, in Weimar; and the Werra, Hainel, Nessa, Ulster, and Felda, in Eisenach; all tributaries of the Elbe and Weser. There are mineral springs near Berka, Ruhla, and Apolda. The principal products of the country are corn, flax, hemp, hops, wine, timber, iron, salt, coal, and fuller's earth. Horses and cattle are bred in Neustadt and Eisenach, and sheep in Weimar, the latter being of the fine Saxon breed. There is an important transit trade, and the manufactures comprise linen and woollen fabrics, hosiery, glass, earthenware, and leather. The population in 1883 was estimated at 313,820, of whom the great majority were Lutherans. Public schools are numerous. The principal towns are WEIMAR, EISENACH, and JENA. There is a celebrated university at Jena, and Weimar is noted for its literary and scientific institutions.

The founder of the house of Weimar was John Frederick of Saxony, born in 1570, whose original patrimony has been considerably augmented by purchase and the extinction of some of the collateral branches. At the Congress of Vienna Charles Augustus received an accession of territory with 77,000 subjects, and the dignity of grand duke. The duchy is now included in the German Empire.

The grand duke has an income of about £42,000. The constitution was granted on 5th May, 1816, but slightly altered by the law of 15th October, 1850. The legislative power is vested in a House of Parliament, represented by one chamber, and composed of thirty-one members, of whom ten are chosen by the wealthier classes. The Chamber meets every three years, and a standing committee of nine members continues to sit during the adjournment. During the session the members have an allowance of about 12s. per day, besides a moderate sum for travelling expenses.

SAX-HORN, a valved musical instrument invented by Adolphe Sax, of Paris. It is made of brass, in numerous varieties of shape and form. It ranges from a double bass in E flat to a treble in B flat. The former has entirely superseded the ophicleide, and the latter is the only brass instrument that can reach with certainty and just intonation the notes of the upper octave of the flute. So varied are they that complete bands have been formed of sax-horns alone. The effect of their introduction was to drive out horns, oboes, and bassoons from the French military bands. Nevertheless, as it is found that trumpets, French horns, and trombones blend better with stringed instruments, sax-horns, with two exceptions, have not entered the orchestra proper. These exceptions are the baryton and the euphonium, which differ chiefly in width of bore, and may be regarded as one variety, and the bombardon, a very heavy rich bass instrument. The compass of all the sax-horns is very large and their execution facile. Sax also invented the *saxophone*, a brass instrument with a simple reed similar to the clarinet. The bass variety is played with a double reed like the bassoon. The saxophone is useful in military bands, but is too coarse in tone for the true orchestra.

SAXICA'VA. See *GASTROCHENIDE*.

SAXIFRAGA (literally "stonebreaker"), a genus of plants, the type of the order *SAXIFRAGEÆ*.

The species are mostly inhabitants of alpine and sub-alpine regions of the colder and temperate parts of the northern hemisphere. They are most of them true rock plants, and sending forth their roots between the crevices of rocks on which they grow, they loosen minute fragments, and in this way, according to the ancient doctrine of *signatures* (as it was called), they were thought to have an influence over calculus in the human system. Many of these species are well known as ornamental plants in our gardens, for which their hardy habits and beautiful flowers well adapt them.

Saxifraga umbrosa (London pride, or none-so-pretty) was found by Tournefort on the hills of Spain, and is a native of Ireland. It is one of the most popular of garden flowers. *Saxifraga granulata* (granulated meadow saxifrage) is abundant on gravelly soils in the British Isles. The roots of this species, forming as they do little granular masses, were at one time sold in the shops under the name of Saxifrage Seed. It was formerly used extensively in nephritic and urinary diseases. Several varieties of this pretty saxifrage are frequently found in gardens. *Saxifraga aizoon* (aizoon or maginated saxifrage) is a native of alpine situations in Austria, Switzerland, and most countries of the continent of Europe. It is frequent in gardens, bearing flowers with cream-coloured petals and reddish dots, opening in June and July. It is perennial, and perfectly hardy. *Saxifraga corymbosa* (pyramidal saxifrage) is a native of the mountains of Lapland, Norway, Iceland, Switzerland, and the Pyrenees. It is commonly cultivated and well known for the profusion of beautiful white flowers it produces, which appear early in summer. *Saxifraga hypnoides* (mossy saxifrage, or ladies' cushion) a frequent plant in mountainous situations of the British Isles, especially among limestone rocks, is also found on the mountains of Norway and on the Pyrenees. It thrives in gardens, on shady walls, and among rock-work.

SAXIFRAGEÆ, an order of plants belonging to the POLYPETALÆ. They are for the most part mountain plants, chiefly remarkable for the delicacy and beauty of their flowers. They inhabit Europe and the northern parts of the world, and constitute the chief beauty of the vegetation in high alpine stations. The species possess astringent properties. *Heuchera Americana* is remarkable for its powerful astringency, and is used in medicine under the name of the North American alum root. *Chrysosplenium* is reputed to possess both aperient and diuretic properties. The order Saxifrageæ is distinguished by the following characteristics:—The calyx has five lobes; there are four or five petals; the stamens are as many as the petals, or double the number; the ovary is syncarpous, and generally two-celled; there are as many styles as cells of the ovary; there are several anatropous ovules attached at the axis of the cells; the fruit is capsular or baccate; the embryo is minute in abundant fleshy albumen. There are about 540 species, trees, shrubs, or herbs, having leaves without stipules. They are natives chiefly of the temperate and colder regions of the world.

SAXO, with whose name is commonly found the addition of *Grammaticus*, the Grammarian, or the Learned Man, was a Dane of the twelfth century, and the author of a history of that nation in sixteen books. It ends with the year 1186. It is written in Latin, in a somewhat florid style, and for the later years is a most authentic and valuable historical record; but the earlier portions are not critical, and therefore are of less certain authority. There is an edition in folio (Paris, 1514), with the title "*Historia Regum Herolymque*;" and a more modern one by Müller and Velschow ("*Historia Danica*," Copenhagen, 1839). He is said to have been a secretary of the archbishop, and to have died at Koeskilde in 1204. The name of Saxo Grammaticus is connected with English literature as that of the author who first gave the history of "Hamlet the Dane."

SAXON or OLD ENGLISH ARCHITECTURE

denotes the style of building which, in this country, intervened between the architecture introduced by the Romans and that imported from Normandy in the time of Edward the Confessor, and matured and developed subsequently to the Norman Conquest. Its earlier monuments, some of which were probably wooden structures, have perished, and there is now no undoubted relic of the style existing previous to the commencement of the eleventh century. About 100 churches in England, however, are still in existence which are Saxon, either in whole or in part. Of these Deerhurst Church, in Gloucester, the earliest dated church in England, is a good specimen. It was built by Earl Odda in the reign of Edward the Confessor. The tower is unusually lofty, consisting of four storeys, and is divided by a wall, extending to the top of the third storey, into two parts. The masonry is very rude and wide-jointed rag-work, with some herring-bone, and with long and short work at the angles. The doorways are round-headed, with clumsy dripstones and rude sculptures over them. The windows of the tower on the north and south sides are small and round-headed, the head of each cut out of a single stone, and the jambs each also formed of a single stone. In the east wall is a curious double window with triangular heads, the shafts ornamented with an imitation of Roman fluting, and the capitals cut into a series of small receding square fillets. The arches in Saxon architecture are semicircular when of a considerable size, but there are smaller apertures of doors and windows with triangular headings to the apertures. In some doors, and in some larger arches, there is a regular impost at the spring which has a rude resemblance to Roman mouldings. The ornaments are coarse, much ruder than the subsequent Norman work, and very shallow, such as could be worked by the hammer or pick without the aid of the chisel. As to plan, all the corners are square, the columns massive and short, and the walls usually very thick, so that no buttresses were required. Another excellent specimen of the Saxon ecclesiastical architecture may be seen at Worth, in Sussex, and a fine tower, often quoted as typical of the style at Earl's Barton, Northamptonshire. One church in Oxford also remains in excellent preservation. The general plan and disposition of the later Saxon churches were as follows:—The chief entrance was at the west end of the nave, at the upper extremity of which was a cross with the arms extending north and south. The choir occupied the east end, and terminated in a semicircular apse. Over the centre of the cross was a tower, and another was sometimes added to contain the bells, and occasionally even two. The larger churches consisted of a nave and two side aisles, one on each side of the nave, and were divided into three tiers or storeys, the lower consisting of a range of arcades on each side, the middle a range of galleries between the roof and vaulting of the aisles, and the uppermost a range of windows. The pillars were either square, polygonal, or circular, and both walls and pillars were of great thickness. The doors in general were deeply recessed, and a series of equidistant engaged columns placed upon each jamb. The ornaments of columns and mouldings were of simple forms and comparatively rude workmanship. From the descriptions that remain to us in the old chronicles of ancient Saxon churches that have crumbled into ruins, it would appear that the Saxon style was founded upon the Roman, and was the transition from it to the Norman. The last Saxon work of importance was the original abbey church of Westminster, built by Edward the Confessor, and finished and consecrated one year before the Norman Conquest. It appears to have approximated to the Norman style, which, after the Conquest, rapidly took the place of the Saxon, and, in its turn, was superseded by the more perfect and graceful Early English.

SAXON or ANGLO-SAXON LANGUAGE and LITERATURE.

The terms Saxon and Anglo-Saxon have been popularly used to designate that early form of our language which prevailed to the close of the twelfth century. But the use of these terms is comparatively modern, and the men who spoke this dialect always called it "English." Accordingly, scholars now refuse to break the continuity of the history of our tongue, and the whole is regarded as one speech. What is necessary for the present work has been said under the headings **ENGLISH LANGUAGE and ENGLISH LITERATURE.** Those who wish to study the subject in detail are referred to the "Philology of the English Tongue," by Professor J. Earle, and to the "Anglo-Saxon Reader," by Sweet (Clarendon Press, Oxford), for convenient summaries; and the works of Bosworth will serve those who wish for greater completeness.

SAXON SWITZERLAND, a district of Saxony near Dresden, on the Bohemian frontier, where the Elbe passes through the Erzgebirge, so named from the picturesque scenery which it presents; abounding in high, abrupt, isolated, flat-topped hills, deep-wooded glens, and fine ruins.

SAXONS (Lat. *Saracenes*, Ger. *Sachsen*, from an old word *sachs*, a knife), the name of a branch of the German nation. The earliest writers describe them as neighbours of the Danes, south of the Cimbrian Chersonesos or Jutland. Tacitus, though he speaks of the Angli and Varini, who must have been close neighbours of the Saxons, does not allude to the latter. The Saxons at first occupied a great part of the country between the Elbe and the Cimbrian Chersonesos; but afterwards we find them occupying the country between the Elbe, the Rhine, the Lippe, and the German Ocean. This extensive tract of land is called by our earliest writers Old Saxony, to distinguish it from New Saxony, or England.

In the third century the Saxons often landed on the coasts of England and France, and ravaged the maritime districts, where they founded many colonies. In Normandy they firmly established themselves on a tract of land named after them the *Limbs Saxonius*. About the middle of the fifth century (449) a large body of Saxons and Angles sailed over to England, and established the kingdom of Kent. The Angles, however, seem to have prevailed in numbers or influence, for it was they that gave the name to their new country, Angel-land or England, and to its speech, English. The name Anglo-Saxons, as comprising both Angles and Saxons, was used by some of the Old-English kings ("Angul-Saxonum Rex"). But in the popular sense of the Saxons in England, as distinct from the Saxons in Germany, it is a mere modern invention. The history of the Saxons who settled in England, and with the Angles became the origin of a new population, henceforth forms part of English history.

Those Saxons (the *Alt-Sachsen* or Old Saxons) who remained in Germany conquered, about 530, conjointly with the Franks, the northern part of Thuringia as far as the river Unstrut, but soon after gave up the eastern part of their conquest to a Slavonic tribe. The southernmost of the Saxons became tributary to the Franks about 550. In proportion as the Saxons advanced towards the interior of Germany, and became better acquainted with agriculture and the breeding of cattle, they abandoned their former piratical mode of living, but remained, nevertheless, a warlike people.

Towards the close of the seventh century the Saxons were divided into three great tribes, the Ostfali on the western side of the Elbe, the Westfali in the country between the Rhine, Lippe, and Ems, and the Engri in the centre, between the two former tribes, that is, on both banks of the Weser. In the name of religion (the Saxons being heathens) cruel wars were carried on against them by Charles the Great from 772 till 803. Many thousand Saxons fell in battle, or were put to death because they

refused to adopt Christianity. But they held out to the last, even after their King Wittekind had submitted and became a Christian. The treaty of Selz on the Saale (803) terminated the war: the Saxons agreed to receive baptism, and were put on a footing of equality with the Franks. Henceforth their history forms a part of that of the Carolingian Empire. To establish the new religion more firmly Charles the Great founded seven bishoprics, and from the places he appointed as the seats for these ecclesiastical dignities we may see the extent of country which the Saxons then occupied. They were Osnabück, Verden, Bremen, Paderborn, Minden, Hildesheim, and Münster.

Almost the sole monument of the Old Saxon language left us is a "Harmony of the Gospels," a poem called the "Heliand" (*Hiland*, Saviour), of the ninth century, one copy of which is in the British Museum. This was first published by Schmeller (1830-40), and has since been often reprinted.

SAXONY (Ger. *Sachsen*). Taken in its most extensive sense the name of Saxony formerly designated a very large tract in Northern Germany, extending from the Weser on the west to Poland on the east.

The present kingdom is bounded on the S. by Bohemia, and on all other sides by Bavaria, Prussia, Saxe-Weimar, Saxe-Altenburg, and Prussia. The greatest length is 144 miles, the breadth varies from 40 to 88 miles. It is divided into the four circles of Dresden, Leipzig, Bautzen, and Zwickau. The area is 6777 square miles, and the estimated population in 1883 was 3,970,895.

The river Elbe, traversing Saxony from south-east to north-west divides it into two unequal portions, between which a considerable difference exists in wealth and productive powers. The eastern and smaller division lies contiguous to Bohemia, from which it is separated by a portion of the Riesengebirge Mountains, which in some places attain an elevation of 1000 feet. This district also contains another mountain region, the western declivity of which is intersected by numerous depressions, ravines, and valleys, and forms a very picturesque spot, designated **SAXON SWITZERLAND**, though none of its heights rise to above 2000 feet in elevation. It is in general a poor country, but the plain of Bautzen and some other parts are very fertile.

The western or larger portion of Saxony, which is situated west of the river Elbe, is naturally divided into three regions, the mountains, the Lilly, and the plain. The mountain region lies within the Erzgebirge, extends over the northern slope of that range, and is bounded on the south by Bohemia. It has many summits from 2000 to 3000 feet high, and one, the *Neißeberg*, is 3966 feet. The Lilly region, which extends along the northern base of the mountains, reaches northward to a line drawn from Meissen on the Elbe westward to Dobeln, Kolditz on the Mulde and Borna. The northern portion of Saxony west of the Elbe is a plain, and constitutes the most southern part of the great level tract which extends to the shores of the Baltic. It is the most fertile portion of Saxony, though it contains several districts covered with heath. The climate is various, owing to the great difference of elevation in the surface. In the plains it is mild and salubrious, but a portion of the mountain district of the Erzgebirge is called *Saxon Siberia*, from the severity of the weather in winter. The mean temperature of the year at Dresden, the capital, is 49° 1'; in winter, 32° 7', and in summer, 66°; while at Altenburg, but 20 miles further south, the average during the year is only 42° 5' Fahr.

The principal river is the Elbe, which is navigable for large river boats, barges, and small steamers through the whole of its course, as far as it lies within the boundaries of Saxony. It is joined by the Black Elster, Roder, Freyberg, Zwickauer Mulda, and White Elster.

The soil is cultivated with great care, and large crops of grain are obtained, that of rye being the most important. Wheat and barley are principally grown in the valleys, and oats and potatoes in the higher districts. Hemp, flax, tobacco, chicory, rape-seed, madder, saffron, poppy, coriander, and anise are also raised, but not in large quantities. Vegetables and fruit are very abundant, and a good deal of wine is produced from the vineyards of the Elbe, though its quality is said to be not very good. Almost a fourth part of the kingdom is covered with forests, which furnish excellent timber, consisting chiefly of pine and fir, and form one of the chief sources of wealth and industry.

The breed of cattle has been very much improved, and stock is now raised in considerable numbers in the high grounds, as well as the celebrated Merino sheep, which, since 1765, have yielded a supply of the finest wool, much of which is exported to England. The horses are good, but are not extensively reared; there are also some swine, goats, and domestic poultry. Foxes, badgers, and hares are found in great abundance; lynxes and wild cats are rare; birds of prey are everywhere met with. There are also bustards, storks, heathcocks, pheasants, partridges, wild geese, ducks, and swans.

The mineral riches consist of gold, silver, copper, iron, lead, tin, cobalt, arsenic, vitriol, bismuth, nickel, zinc, antimony, quick-silver, calamine, rock crystal, various precious stones, potter's earth, the finest porcelain clay in Europe, basalt, serpentine, granite, marble, alabaster, fluorspar, sandstone, limestone, slate, porphyry, black amber, brimstone, alum, saltpetre, and coals. Altogether upwards of 500 mines, employing 12,000 hands, are in active operation: the centre of the mining district is **FREIBERG**. The ore is generally rich and abundant, and the processes of smelting and excavation are in a high state of perfection.

Next to England and the Netherlands Saxony has, in proportion to its population, the most extensive manufactures in Europe. It produces damask and other linens, lace of great beauty, embroidery, silk, cotton, and woollen manufactures, principally merinoes and delaines; the fine porcelain of Meissen, called Dresden china, which is equal to that of France; paints and articles for decorative use made from cobalt ore; pianos and other musical instruments. There are also paper-mills, tanneries, breweries, distilleries, and foundries. The chief manufacture is that of cotton, in which great improvements have been made, and many cotton printing works are now established. A great proportion of Saxon machinery is used for spinning, weaving, stocking-making, embroidery, sewing, &c. Nineteenths of the cotton, and more than one-half of the woollen fabrics are manufactured in the circle of Zwickau.

The centre of the commerce of the country is **LEIPZIG**. The inland trade also is mostly conducted by the merchants of this city, which is so highly renowned for its book fairs. The principal exports are—fine woollen manufactures to England, Spain, Turkey, and Russia; linen, lace, &c., to Italy, England, Spain, and France; thread, wool, worsted, porcelain, straw manufactures, wooden wares, glass, fruit, timber, and mineral products. The imports are salt, cotton, silk, flax, hemp, tea, colonial produce, salt and dried fish, fancy goods, &c. Saxony is one of the members of the Zollverein or German Customs Union. The very extensive commerce of the country is facilitated by the river Elbe, and by railways from Dresden to Leipzig, Halle, Berlin, &c. Altogether there are about 1405 miles of railway open in the kingdom.

Religion, Education, &c.—There is no state religion; most of the inhabitants are Lutherans, but the royal family having embraced the Roman Catholic faith in 1697, that religion was, in consequence, tolerated, and since the treaty of Posen, in 1811, the Lutheran and Romish religions are placed on an equal footing, and the professors of both enjoy the same rights. The number of Roman Catholics

does not, however, much exceed 70,000. Saxony holds a high rank with regard to the number and the excellence of its institutions for education and the general diffusion of knowledge, there being very few countries where the lower classes are so generally taught to read and write. The number of printing offices and booksellers' shops greatly exceeds that in any other country of equal extent. It has the second largest university in Germany, that of Leipzig, founded in 1409, and attended, on the average of recent years, by 3000 matriculated students.

The constitution is an hereditary limited monarchy. In the hands of the king is the sole executive power, which he exercises through responsible ministers. The legislature is jointly in the king and Parliament, the latter consisting of two chambers. The qualification for a seat in the Upper House, as well as the right of election to the same, is the possession of a landed estate worth at least 3000 marks a year, which qualification, however, is not required by the *ex officio* deputies of chapters and universities. For a member of the Lower House no fixed income is required; and all men above twenty-five years of age who pay taxes or contribute in any way to the public burdens enjoy the privilege of electors. A salary is attached to the performance of the legislative functions, the members being allowed about 12s. a day during the sittings of Parliament. Both houses have the right to make propositions for new laws, the bills for which, however, must come from the ministry.

The annual revenue is about £4,000,000, and for some years past there has been a gradually increasing surplus of income over expenditure, which is appropriated to the reduction of the public debt. The greater part of the railways is state property, and yields a considerable annual revenue. In the late Germanic Confederation Saxony held the fourth rank. Saxony is one of the most densely peopled countries in Europe.

History.—Among all the barbarian nations which resisted the ambition of Charlemagne the Saxons were the most warlike and the most formidable. They were only subdued after a series of arduous campaigns, when the great Western emperor established seven bishoprics in their country, converted them from Paganism, and planted numerous fiefs or military colonies among them. Prior to this event they had harassed all Western Europe by their incursions, and offshoots from their stock had invaded Britain, where in due time they established seven or eight independent principalities. It is impossible to determine with accuracy the original seat of the race, or the exact boundaries of the territory formerly included under the general denomination of Saxony or the Land of the Saxons. Roughly speaking it comprised the then wild and uncultivated region between the Elbe, the Rhine, Friesland, and the Hartz Mountains. The Saxons, however, were not only a warlike race, fond of the clash of battle and prone to predatory incursions, but devoted to agriculture; and exchanging the sword for the plough after their subjugation by Charlemagne in 803, they converted a wild waste of country into a scene of smiling fertility.

About 850 Saxony was erected into a dukedom under Ludolf. He is supposed to have been the great-grandson of Wittekind, who claimed descent from the Norse god Woden, and was the founder of the present reigning house. Ludolf, in 880, was succeeded by Otho the Illustrious, his second son, a prince of great courage and ability, who distinguished himself in the wars against the Northmen or Normans, and on the extinction of the Carolingian dynasty in 911, refused the imperial crown pressed on his acceptance by all the German princes. It was, however, assumed in 919 by his son Henry, surnamed the *Fowler*, the first of the Saxon line of German emperors, continued by Otho I., Otho II., Otho III., and Henry II., with whom it terminated in 1024. The dukedom of Saxony was bestowed by Otho I., about 960, upon a successful captain,

named Hermann Belling, on the usual conditions of feudal tenure. Under him and his immediate successors it prospered greatly, and its boundaries were largely extended. In 1113 it passed by marriage to Count Lothar of Supplinburg, who ruled over the country lying between the Unstrut and the Elbe, Pomerania, and the Rhine. In 1125 Lothar obtained the imperial crown. The Saxon duchy then devolved on his son-in-law, Henry the Proud, duke of Bavaria, and one of the ablest sovereigns of the Guelphic line, whose sway consequently extended over more than half of the country now known as Germany. This splendid possession, however, fell to pieces in the reign of his son, Henry the Lion, Bavaria passing to the house of Wittelsbach, Westphalia and Oldenburg to independent bishops, who enjoyed both temporal and spiritual power, Thuringia to the Landgrave Ludwig, and East Saxony to the Elector Bernard of Ascania. The duchy was accordingly reduced to a narrow territory, whose capital was placed at Wittenberg. In 1260 it was further diminished and divided into two independent principalities, Saxe-Lauenburg and Saxe-Wittenberg, the latter of which enjoyed the electoral title, confirmed to it in 1356 by the celebrated Golden Bull of Pope Innocent VI.

The Ascanian line of princes became extinct in 1422, and the duchy then passed to Frederick the Warlike, Margrave or Margrave of Misnia and Landgraf of Thuringia, who thus became one of the most powerful of the German sovereigns. He was succeeded in 1428 by his son Frederick II., whose sons, Ernest and Albert, according to an unwise provision of their father, divided the duchy between them, Ernest obtaining the electorate, Thuringia, and half of Osterland, and Albert Meissen and the other half of Osterland.

Ernest, the founder of the Ernestine, elder, or electoral line, was succeeded by his son, the illustrious Frederick the Wise (1486-1525), eminently distinguished in history as the patron of Luther, and one of the most powerful promoters of the Reformation. His brother, John the Constant (1525-32), likewise espoused the Lutheran doctrines, which were gallantly advocated by John Frederick the Magnanimous (1532-47), even at the risk of life and crown. Defeated at the fatal battle of Muhlberg by the imperial forces under Charles V., he was deprived of the electoral dignity.

Returning now to the Albertine or younger line, we find Duke Albert succeeded by his sons George (1499-59), a bigoted adherent of the Roman Church, and Henry the Pious (1539-41), a zealous Lutheran. Maurice, a soldier of great repute, came to the throne in 1541. He distinguished himself greatly on the Catholic side in the religious wars which at this period desolated Germany, and after the victory of Muhlberg received the electoral title and estates of the unfortunate John Frederick. Maurice, however, was now induced, by his opposition to the arbitrary measures of Charles V. and an apparently sincere detestation of religious intolerance, and partly, perhaps, by his daring and ambitious character, to embrace the Protestant cause. At the head of the Lutheran forces he marched against the emperor and dictated to him the celebrated peace of Passau.

After a glorious and stirring career he died at Saalfeldhausen, 11th July, 1553, and was succeeded by his brother Augustus I. (1553-86), who, during a long and peaceful reign, consolidated his dominions, improved their administrative organization, and developed commerce, and promoted, by a series of successful reforms, the happiness and prosperity of his subjects. Christian I. reigned from 1586 to 1591, Christian II., from 1591 to 1611; but neither has left any mark in history. John George (1611-36), a prudent and politic prince, allied himself with the Swedish king, Gustavus Adolphus, and added to his dominions Upper and Lower

Lusatia. The electorate at his death was divided between his sons, John George II. (1656-80), Augustus, Christian, and Maurice, but the dynasties established by the three latter all became extinct within eighty years.

John George III. (1680-91) and John George IV. (1691-94) were sovereigns of no great renown. The reign of Duke Frederick Augustus I. (1694-1733) was marked by a series of disasters, which, rather than any eminent merits of his own, have preserved his name and memory. He was elected King of Poland, and allying himself with the Czar of Russia against Charles XII. of Sweden was driven by the latter from his dominions, which were ravaged by the Swedish armies. Duke Frederick Augustus II., also king of Poland, embroiled his country in the war of the Austrian Succession, at first as the enemy, and afterwards as the ally of Maria Theresa. During the Seven Years' War Saxony suffered grievously. Her fertile fields were desolated, her villages burned, and her towns garrisoned and plundered by foreign troops. Passing over the few months' reign of Frederick Christian (1763) we come to that of Duke Frederick Augustus III., extending from 1763 to 1827, a period of sixty-four years. At the battle of Jena in 1805 he supported the Prussians with 22,000 Saxon troops, but the victories of Napoleon compelled him to accept the French alliance and join the emperor's Confederation of the Rhine. After the battle of Leipzig in 1813 he became a prisoner in the hands of the allies, who deprived him of nearly one-half of his territory, which they bestowed upon Prussia, but allowed him to retain the title of king (as Frederick Augustus I.) conferred upon him by Napoleon in 1806. A new and liberal constitution was granted to the kingdom by Antony Clement in 1831, after a popular demonstration excited by the successful revolutionary movements in France. He was also compelled to nominate as regent his nephew, King Frederick Augustus II., who was known to be a sincere admirer of a constitutional form of government, and who ascended the Saxon throne on the death of his uncle in 1836. John I. succeeded him in August, 1854, and he was in turn succeeded by his son Albert, in October, 1873. At the outbreak of the Seven Weeks' War in 1866, between Prussia and Austria, John I. refused to join the former or to observe an impartial neutrality. The Prussian victories, however, compelled him to dismiss his philo-Austrian minister, Baron Beust, and to accept the conditions imposed upon him by the court of Berlin. His troops were then organized on the Prussian system, included as a corps in the North German or Prussian army, and as such fought very bravely during the war with France in 1870-71. Though the kingdom of Saxony is nominally independent, to all intents and purposes it forms a portion of the German Empire.

SAXONY, PRUSSIAN, is composed of almost the whole of the portion of Saxony ceded to Prussia at the Congress of Vienna, to which the principalities lying to the north of the duchy of Anhalt and to the west of the Elbe and the Havel have been added; the whole forms an area of 9749 square miles. The population in 1881 was 2,312,007, nearly all of whom were Lutherans. The province is bounded on the N.E. and E. by Brandenburg; on the W. by Hanover, Brunswick, and Hesse-Cassel; and on the south by the kingdom of Saxony.

The principal river is the Elbe, into which flow the Havel, Saale, Mulde, and Unstrut. The greater portion of the province belongs to the plain of Northern Germany, and contains gentle eminences, but no mountains. The climate of the district is generally mild and healthy, and the soil, which is among the most fertile in the Prussian dominions, supplies the population with the most important articles of food. Corn, flax, hemp, hops, tobacco, madder, &c. &c. are the principal products. The vine is cultivated on the banks of the Elbe and Saale. The fine wool

of the improved breed of Merino sheep supplies the extensive woollen manufactures of the province. The mineral products are chiefly coal, salt, copper, antimony, cobalt, and iron. The manufactures are woollens, leather, calico, fine linen, earthenware, paper, and beer. There are several sugar refineries, brandy distilleries, tobacco manufactories, oil mills, and porcelain works. The exports are wool, corn, woollen and cotton manufactures, brandy, copper, iron and steel wares, and salt. The capital is MAGDEBURG.

SAX'OPHONE. See SAX-HORN.

SCAB' BARD FISH (*Lepidopus caudatus*) is a species of fishes belonging to the family Tichhiuridæ (HAIR-TAIL). It is tolerably common in the Mediterranean and the warmer parts of the Atlantic, extending northwards to the British coasts, where, however, it is a rare visitor, and southwards to the Cape of Good Hope; it also occurs on the coasts of Tasmania and New Zealand. The body is greatly elongated, compressed, band-like, and scaleless. There is a single dorsal fin extending the whole length of the body. The ventral fins are reduced to a pair of round scales. The scabbard fish grows to a length of 5 or 6 feet, but the body is so compressed that a specimen of this length will only weigh 6 lbs. without the intestines. It swims with great rapidity. The flesh is firm and delicate, and is eaten in Mediterranean ports. In New Zealand, where it is called the Frost Fish, it is esteemed a great delicacy. Another species, *Lepidopus tenuis*, occurs off Japan.

SCAD or HORSE MACKEREL (Carangidæ) is a family of fishes belonging to the order ACANTHOPTERYGII. These fishes are carnivorous, inhabiting tropical and temperate seas. They have a compressed oblong body, naked or covered with small scales. The Common Scad or Horse Mackerel (*Coranz trachurus*) is common on the coasts of Cornwall and Devonshire, and is widely distributed in tropical and temperate seas in both hemispheres. It is about 12 inches long, of a dusky green colour, the head and belly being silvery and the throat black. The first dorsal fin has eight spines, and is continuous with the soft dorsal. There are two small spines in front of the anal fin. The body is covered with small scales. The horse mackerel often appears in great shoals, pursuing young herrings or sand launces. These fishes are largely preyed upon by gulls and other sea-birds. The flesh resembles that of the mackerel; it is not often eaten fresh, but is salted on the Cornish coast, where these fishes are abundant during the summer. About ninety species of the genus *Caraux* are known, especially from tropical seas, some of which attain a length of over 3 feet. The **PILOT-FISH** (*Nauclates*) and the **BOAR-FISH** (*Cypros aper*) also belong to this family.

SCÆVOLA ("the left-handed"), an honourable surname acquired by the hero Caius Mucius in early Roman times. When Lars Porsena was blockading Rome with his Etruscans, young Mucius devoted himself to rid his country of the terrible foe. He penetrated to the tent of Porsena, where he found Porsena's secretary engaged with officers. Taking him for the Lars himself Mucius drew the dagger he had concealed and killed him on the spot. He attempted no flight, and waited his doom with constancy. When dragged before the real prince, Mucius avowed his design and explained his error, adding that though he had failed there were many more youths in Rome ready for the task. Lars Porsena sought to question him further, and as he could not make him answer as he desired he ordered him to be burnt alive. There was an altar-fire burning near, and Mucius, to show that these threats were of no avail, calmly held his right hand in the flames till it was consumed. The Etruscan was astonished at this fanatical courage, and set Mucius free, while he himself departed, feeling sure that it was a hopeless task to try to subdue a city where the youths were of this heroic

type. The grateful city gave "the left-handed one" a tract of land across the Tiber, ever afterwards known as Mucius' field (*Mucia prata*).

There were several noteworthy men of the Scævola family, two of whom need a brief mention here.

Quintus Mucius Scævola the Augur was a great friend of Scipio Africanus Minor, and was the son-in-law of another great friend of his, Caius Lælius. He filled all the great offices of the republic, ending with the consulate in B.C. 117. He died a very old man, about B.C. 85. Cicero, when a boy, was taken by his father to hear Scævola speak and study his methods, which were considered worthy of imitation. He was renowned for his great knowledge of the law. He is one of the speakers in Cicero's famous dialogues, "*De Oratore*," "*De Amicitia*," and also in "*De Republica*." Scævola's daughter Mucia married L. Licinius Crassus, the celebrated orator.

Quintus Mucius Scævola the Pontifex Maximus, so designated to distinguish him from the above, was the son of Publius Mucius Scævola (first cousin of the augur), a great lawyer and statesman, consul B.C. 133 (the year of the slaughter of Tiberius Gracchus), and Pontifex Maximus B.C. 131, in succession to his brother. Quintus, the son of this Publius, also rose quickly to distinction in law and in politics, and was consul B.C. 95, with his relative by marriage, L. Licinius Crassus the orator. He next successfully administered the important province of Asia, and after his return became Pontifex Maximus. In this office he was so famous for the rectitude of his judgments, his vast knowledge of the law, the purity of his character, and the elegance of his oratory that Cicero was in perpetual attendance on him, and might almost be styled his pupil. Cicero exhausts adjectives in praising his master, whom he regards as one of the most illustrious men then on record. Scævola compiled and criticised the whole civil law of Rome in an important work, which, though now lost, is preserved by being the basis of subsequent codifications. The oldest actual quotations in the "*Digest*" are four excerpts from another work of his on definitions or short maxims of law. This famous man was proscribed by Marius during the troubles of the period of civil war, was murdered, and his body thrown into the Tiber (B.C. 82).

SCAF'ELL or **SCAW'FELL**, a mountain on the borders of Cumberland and Westmorland, 13 miles S.S.W. of Keswick, in the neighbourhood of the Lakes. It is the highest mountain in England, and forms, with its double peaks, one 3208 feet and the other 3092 feet in height, a conspicuous feature of the romantic Lake scenery.

SCAF'FOLDING, a temporary erection of timber, usually for the purpose of supporting workmen and materials during the progress of a building. In ordinary buildings the scaffolding requires very little notice. Poles are erected in a vertical position a few feet from the walls, their lower ends being inserted in the ground. Wherever a platform is required for the workmen a horizontal pole is tied to the uprights, parallel with the wall, and from this horizontal pole cross pieces extend to the wall, into which their ends are received to support a flooring of planks. As the building rises the scaffold is strengthened by diagonal poles, and the several poles are fastened by ropes.

In the erection of important buildings of stone a very convenient kind of scaffold has been adopted, consisting of large squared timbers well framed together, and terminating at the top in horizontal beams. Such a framing is erected on each side of the wall, unconnected with it, and rails are laid on the top beams, on which runs a carriage capable of being moved by means of a winch handle connected with the wheels. The carriage itself consists of a frame supporting another railway at right angles with that on which it runs; and on the upper railway is a smaller carriage, which supports tackle suitable for raising the

stones. By this arrangement a stone may be lifted up and moved by the combined action of the two railways, to any point required on the wall.

The centring of arches is a peculiar kind of scaffolding; it is the wooden support or mould on which the arch rests when building. A centring usually consists of a number of distinct frames, resembling the trusses of a roof, placed equidistant from each other in vertical planes, and covered with a series of planks (or beams of timber called bridging joists) laid at right angles with the frames or trusses. This boarding or covering of bridgings forms a convexity coinciding with the internal concavity of the intended arch. For small arches the centring is usually covered with planks, but in large works bridging joists, one laid for each course of arch stones, are preferred, these being kept at the proper distance apart by blocks placed between them. The whole structure is stiffened by cross-bars to keep the trusses equidistant and parallel to each other. Much ingenuity has been applied to the construction of scaffolding for peculiar and unusual purposes, as the erection or repair of domes, columns, obelisks, &c.

The finest scaffolding ever invented, perhaps, was that which surmounted the Victoria Tower at the New Houses of Parliament. It was made to travel upwards as the work progressed, and it revolved on a central axis, so that four extended arms of scaffolding could be brought over every part of the tower in turn. Some ingenious scaffolding was recently employed in the decoration of St. Paul's Cathedral.

SCALA, DELLA, or **SCALIGERO**, a historic noble house of Verona, which rose to the lordship of its native city and of a considerable circumjacent territory. **MARTINO DELLA SCALA**, of the Ghibelline party dominant in Verona, was elected podestà (chief magistrate) for a term of years, about 1260. This dignity was afterwards secured to him for life, and he enjoyed it until 1277, when he was murdered on account of a private grudge. **ALBERTO**, brother of Martino, was chosen by the popular voice as his successor, and was subsequently called to the lordship of Vicenza, Feltre, and Belluno, by the citizens of those towns. He died in 1301, and was succeeded by **BARTOLOMEO**, eldest son of Alberto; died 7th March, 1304, and was succeeded by his brother **ALBOINO**, who, after a short reign, handed over the government to his younger and more enterprising brother, **CAN** (*i.e.* *Capitan* or military leader) **FRANCESCO**. He was commonly called **Can Grande** (the great), born about 1290, enlarged the Veronese domain until it included little less than the entire territory subsequently called Venetian. Victorious adversary of the Marquis of Este, honoured adherent and imperial vicar of Henry of Luxembourg, acknowledged head of the Lombard Ghibellines, warrior and politician, Can Grande occupies yet another position in the annals of his era as the magnificent entertainer of men eminent in letters, in art, or in arms; and himself being in his degree a poet, especially as the host of Dante Alighieri in his exile. Can Grande died of fever in 1329, and was succeeded by **ALBERTO** and **MARTINO**, his nephews. **CAN GRANDE II.**, son of Martino, succeeded in 1352. He was killed by his brother, **Can Signore**, in 1359, and was succeeded by **CAN SIGNORE**, and another brother **PAOLO ALBOINO**. Can Signore afterwards imprisoned Paolo Alboino, whom he ultimately put to death, himself dying in the same year, 1379. His successors were **BARTOLOMEO II.** and **ANTONIO**, his illegitimate sons. Antonio murdered Bartolomeo in 1381; was expelled from Verona by Gian Galeazzo Visconti, duke of Milan, in 1387, and died in 1388, thus bringing to a close the dynasty of Della Scala.

SCALD. See **BURNS** and **SCANDS**.

SCALD, properly written *Skald* (the root of the word being the same as that of our word *skiff*), an ancient Scandinavian word which signifies poet. The Scalds were

not merely bards, but also the historians of their nation. Their poetry is almost the only source whence we derive our knowledge of the ancient annals of the north of Europe. We still possess a very long list of the last of the Scalds of the thirteenth century, preserved in a MS. of the younger Edda, among whom are persons of the highest rank, and even kings. The most distinguished were those of Iceland. As with the Welsh princes and the Highland chiefs, so in Iceland and also in other Scandinavian countries, Scalds were kept by each magnate at his petty court, to celebrate his own deeds and those of his ancestors. Though none of the lays remain complete to us many fragments of famous songs of Scalds are preserved in the younger Edda, the Sagas, the *Hainskunga* of Snorro Sturleson, &c. The songs of the older Edda are more antique, and belong to an era before the Scalds yet existed. The metres and the alliterative devices were very elaborate, and made the work of the Scalds a very complicated and mechanical business. The varieties of stanza were very numerous, 106 being given by Snorro Sturleson (thirteenth century) in the "*Hattalkyi*" (key of measure). The number of synonyms required was unlimited, for the etiquette insisted upon nothing being directly named, but everything being described by allusion and metaphor. The name of the god Odin, for example, had over 100 equivalents.

SCALD-FISH (*Arnoglossus laterna*) is a species of FLAT-FISH (*Pleuronectidae*). The scald-fish is common in the Mediterranean, and extends to the south coast of England. The name refers to the fact that the scales are so deciduous that they are shed on the fish being lightly handled as if it had been scalded. It is usually 4 or 5 inches long, shaped like a sole; it is reddish-yellow in colour, paler at the margins of the fins. This fish is rarely captured, as it never takes a bait. The dorsal fin commences on the snout. There are six other species of the same genus from European and Indian seas.

SCALE, in music. In the article KEY it is stated that a scale is only the notes of a key set in regular melodic order, from grave to acute, and the manner is explained in which the major, minor, and chromatic scales are formed from the various intervals given by the notes in use among us, these notes being each at fixed ratio or distance, and all being reckoned from the note which has arbitrarily been pitched upon as the keynote. The ratios of the various notes are given fully in the article INTERVAL.

If for the keynote we take any sound vibrating 264 times in a second, then our English major and minor scales appear in perfectly just intonation as under, expressed in sound-vibrations per second—

Key-note, or C	D	E	F	G	A	B	C
Major,	264	297	352	352	396	440	495
Minor,	316.8	422.4	...

The minor scale has a flat Third and a flat Sixth. If to the above a flat Second and Seventh and a sharp Fourth be added we have the twelve notes of the chromatic scale. All English music is expressed by these twelve sounds, repeated in higher or lower octaves.

But in the article KEY, and more especially in the article TEMPERAMENT, it is shown that the twelve notes, though sufficient for any one key, are insufficient for more than that one key. To be strictly in tune we should require to modify several of the notes directly we passed from our first key into another. The only way to avoid the large multiplication of intervals which thus results is to strike a sort of average (temperament), and by adopting an artificial tuning, which is very near the truth for all keys, and is equally wrong for all, we make the twelve notes do very well to serve all keys alike. Now the ear is good-natured enough to pass these incorrect intervals as true, much as, to use a familiar simile, coin, although worn, passes at its full value; although the ear, if challenged, is ready enough

to detect a variation from the truth, like the banker who weighs the coin he receives, and rejects the light specimens.

This of itself proves the essentially artificial nature of music. The ear can be trained to appreciate any given set of ratios, and so long as that set is carefully observed the ear is satisfied and charmed. Therefore there follows from this consideration what is the real fact in the world; that perfect and absolute as our system, with its simple ratios, seems to be, and entirely alone, as it is by its nature, in its power of giving pure harmonized chords, many other and more complicated systems exist, devoted to melody or at the most to very rude and occasional harmony, and to those who know these alone our system seems out of tune, just as their system seems to us. The bagpipe has a very curious scale, for example, and to southern ears it is, and must always be, out of tune; but to the piper it is the one heaven-sent system of vibration-ratios, and our tuning is poor and tame. A Scottish piper complains of an English trumpeter as playing falsely, just as an American ("Anmerican") speaker once found fault with the "English accent" of John Bright. Space does not permit of the full treatment of this interesting subject, for which the reader may be referred to Mr. Ellis' "*Scales of Various Nations*" (*Journal Soc. Arts*, 1885), or to his learned appendix to his masterly translation of Helmholtz's "*Sensation of Tone*" (second edition, London, 1885), a book which has founded the true scientific physical basis of music. Only the following cursory remarks will here be offered, therefore.

Our own scale (the true, not the tempered scale) is, as said above, the only one which allows of all possible chords without beats; and the harmonies of our tempered scale, although they give beats, yet are not too discordant for the good-nature of the ear to pass as true. But there are very few scales in the world as good as this; the vast majority are non-harmonic. Mr. Ellis invented a system of cents which is highly ingenious, to show the relationship of these scales to our own. He takes 100 cents as representing the value of the ratio of the *tempered* semitone, no matter whatever the actual vibration-number may be; and 1200 cents therefore measures the octave, all the twelve semitones being, of course, exactly equal, by temperament. Our major scale (tempered) would stand thus, as expressed in cents, the names of the notes of the scale of C being written above the figures, to facilitate reference—

	C	D	E	F	G	A	B	C
(Cents),	0	200	400	500	700	900	1100	1200

Now take the scale of the bagpipe. It is this—

(Cents),	0	197	341	495	703	853	1009	1200
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But odd as it looks, and absolutely unlike our scale in every single note (the seventh note is of course meant for a kind of B²), it is very closely akin to a familiar Arabic scale used throughout the East. The Arabic scale of Zalzal runs thus—

(Cents),	0	204	355	498	702	853	996	1200
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Much nearer was the ancient Greek scale in the Pythagorean tuning (of course in the Lydian mode the Fourth is sharp, not natural like ours), which runs thus in Lydian—

(Cents),	0	204	408	498	702	906	1110	1200
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The more ancient Greek tuning for Lydian was—

(Cents),	0	182	386	498	702	884	1088	1200
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The Siamese ranats or wood harmonicon, which formed so marked a feature in the playing of the King of Siam's Court Orchestra at the International Exhibition of 1885, gave the following scale, which may explain the odd effect of our English airs when the Siamese politely sought to render them in their entirely different tone material:—

(Cents),	0	208	326	537	698	883	1048	1200
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Prince Prisdang of Siam declares, however, that this tuning was inaccurate according to Siamese theory (just as our tempered tuning is incorrect by our acoustical theories), for the division was intended to be exactly by seven equal intervals, and should run thus—

(Cents), 0 171 343 514 686 857 1029 1200

The scale of Java is nearer our own, with a flat seventh—

(Cents), 0 137 446 575 687 820 1098 1200

But the Javese do not use their whole octave at once. Like much ancient Scottish music, like Chinese and Japanese music, and many other scales less known, the Javese use several pentatonic scales; and the octave just given is obtained by combining all the pentatones together. A *pentatonic scale* is quickest exemplified by the five black digitals of the pianoforte, and many Scottish airs may, as is well known, be roughly indicated by their use alone without touching the white digitals. The explanation is, that such scales avoid the Fourth and Seventh, as when one plays $F\sharp, G\sharp, A\sharp, C\sharp, D\sharp, F\sharp$. Taking $F\sharp$ as 0 we should write the pentatonic scale of the pianoforte black digitals thus—

(Cents), 0 200 400 700 900 1200

The Chinese are great pentatonic musicians, and their scales are therefore deeply interesting to us. Actual measures of many instruments played by Chinese players at the International Exhibition (1885), show their scale to be intended for the above. Here are two examples—

Flute (*Ti-tan*) (Cents), 0 178 418 662 888 1196
Mouth organ (*Sheng*), 0 210 498 915 908 1199

The Japanese, however, use several curious modifications, some of which are as if one were to play the white digitals, A and D, on the pianoforte, instead of the black digitals, $A\sharp$ and $D\sharp$, which is in fact a minor pentatonic scale. Besides their popular pentatonic music of these various scales both nations have a full scale. The Chinese 8 degree scale differs from ours, but the Japanese have, in classical music, both a major (*reosen*) and a minor (*ritsusen*) scale just like ours. The popular 8-degree Japanese scale is, however, a peculiar mixture, running thus (English equivalents being placed above as a guide) —

C $C\sharp$ $D\sharp$ F G $G\sharp$ $A\sharp$ C
(Cents), 0 100 300 500 700 800 1000 1200

SCALES OF NOTATION. See NUMERATION.

SCALE-INSECTS. See COCCIDÆ.

SCALENE, a name given by Euclid, in his definitions (but seldom or never afterwards used by him), to a triangle no two sides of which are equal to one another.

SCALIGER, JULIUS CÆSAR, a distinguished Italian scholar, was born on the 23rd of April, 1484, in the Castle of Riva, near the Lago di Garda. His name was given as Della Scala, and he pretended to be descended from the princely family of the Scalas of Verona. Triboschi calls him the son of Benedetto Bordone, a native of Padua, who lived at Venice, carried on the trade of illuminator, and assumed the name of Scaliger, either because he had a scale for his sign, or because he lived in a street called Scala. Up to the forty-second year of his age Julius Scaliger resided at Venice or at Padua, studying and practising medicine; and he then became physician to the Bishop of Agen, in which town he married, and there he spent the remainder of his life. Although he did not publish any of his works till he was forty-seven years of age, they followed each other after that time in rapid succession, and he soon acquired a European reputation. Besides the commentaries, upon which his fame chiefly rests, he was the author of a work on the "Latin Language," a treatise on the "Art of Poetry," and a

number of Latin poems. His tenth son, Joseph Justus Scaliger (born at Agen in 1540; died at Leyden in 1609), was for many years a professor in the University of Leyden, and was still more celebrated as a scholar and editor of classical texts than the father.

SCALLOP. See PECTEN.

SCAMMONY is a drug of the same nature as JALAP, but being the inspissated juice obtained by making incisions into the living root, it consists of a much larger proportion of resin, without any woody fibre. It is therefore much more powerful, and the dose required much less than that of jalap. Scammony is used in nearly the same cases as jalap, and the smaller bulk of the dose renders it in many instances preferable. It is produced by *Convolvulus Scammonia* [see CONVULVULACEÆ], a native of the Levant. This plant is perennial, with a woody root, 2 or 3 feet long, twining stems, arrow-shaped leaves, and pale yellow flowers, with purplish stripes.

SCANDEROON, *Iskenderoon* or *Alexandretta*, formerly called *Alexandria*, a seaport town in the north of Syria, founded by Alexander the Great, 23 miles north of Antioch, at the head of the Gulf of Scanderoon. It has the best harbour on the Syrian coast, but the port is in a wretched state. Cotton, galls, silk, and syrup are exported, and the import trade is principally in corn, rice, salt, and European goods. It is a very unhealthy place, owing in a great measure to the waters which flow down from the mountains and collect in great marshes round the town.

SCANDINAVIA, a term adopted in geography and history, is of great antiquity. The name Scandinavia occurs in Pliny, who mentions it as an island of unknown extent, but he obviously meant the large peninsula north-west of the Baltic, and, in fact, the termination *arva* implies island. The small sovereignties which existed in this peninsula when it first began to be noticed in history, were united into the two great monarchies of Sweden and Norway in the twelfth and thirteenth centuries. Margaret of Denmark, at the close of the fourteenth century, succeeded in uniting the crowns of Denmark, Sweden, and Norway in her own person. By the union of Calmar (1397) these countries were never to be disjoined. Norway, indeed, remained united with Denmark up to 1814, but Sweden was separated from it in the middle of the fifteenth century. From that time the two countries of Scandinavia constituted separate states until the year 1814, when Denmark was obliged to cede Norway to Sweden.

SCANDINAVIAN LITERATURE. The Old-Norse or ancient Scandinavian language, once common to the whole north-western portion of Europe beyond the Baltic, is now confined to Iceland, whether it was taken by the Northmen in the ninth century when they conquered the island, and where it has been preserved on account of the isolation of the colony, in an almost unchanged state ever since. This is the language of the *Eddas* (seventh or eighth century); of the *Frisksmal*, the myth of King Fie Bloodaxe, who died in 952; and of the *Hakonarnial*, the myth of Hakon the Good. The eleventh and twelfth centuries give us the *Grongaldur* and *Solarljod*, respectively the heathen and the Christian codes of morals. The poetical national work in the Old-Norse (Icelandic) is a noble collection of heroic ballads made in Denmark in the fourteenth century, the famous "Kæmpe Viser." The earliest prose Old-Norse works are of the twelfth century, the histories of Ari the Wise, called "Islandin a bok" and "Landnama-bok;" and the next (thirteenth) century was made famous by Snorro Sturleson's "Heimskringla" (a history of the early kings of Norway), and other works. Collections of codes of laws also exist of great antiquity. This Old-Norse tongue gave rise, as it changed upon the mainland, to both Swedish and Danish, the former of which has retained more of the original character than the latter;

and if not for the literature they contain, in a philological point of view they deserve far more attention than they have hitherto obtained from Englishmen, since they throw considerable light on the history of our own language.

Literature, in the usual meaning of the term, was of exceedingly tardy development in both Denmark and Sweden; and learning continued for a long time to be confined to the Latin of the schools. It was not until after the accession of Cnut the Great (1014) that Christianity became the national religion. But literature can hardly be said to have been cultivated then. The sole monument of the period in Denmark is the history (written in Latin) by SAXO GRAMMATICUS, who died in 1208. In the nineteenth century the University of Copenhagen was established by Christian I., and opened in 1479; yet it was long before either that event or the adoption of the principles of the Reformation effected any improvement in the intellectual condition of the people. In the meantime the Danish language, now one of the softest in sound and most simple in construction of all the Gothic dialects, gradually borrowed more and more from the Low-German, but did not acquire any fixity until the fifteenth century. Its progress was greatly retarded by Latin being employed as the language of the clergy and the students, and German as that of the court and the higher classes. The most remarkable production of the fifteenth century is "*Den Danske Rimkrønike*" (or chronicle in rhyme) of Niel, a monk of Sorø, though it possesses scarcely any literary value in itself, otherwise than as a specimen of the language at that period.

With the Reformation came an impulse towards literature from Germany. Romances of chivalry, legends, tales of magic, moralities, and similar works, were translated into that language, as were also some pieces of Hans Sachs, of the Dutch poet Cats, and even of the Scottish Lindsay. But the earliest literary name of note that has been preserved is that of Anders Arrebo, in the seventeenth century. This writer was born in the island of Årø, in 1587. His chief production is his "*Hexameron*," a poem, in heroic rhyme, on the Creation, in imitation of that by Du Bartas; it displays considerable refinement of language and versification. Jørgen Jørgenson Sorterup is another name of importance belonging to this period. His "*Heltesange*," or heroic songs, wherein he celebrates the naval achievements of his countrymen and the victories of Frederick IV., revive the animated strains of the older "*Kæmpe Viser*." But Sorterup and his immediate predecessors constitute only the first faint dawning of Danish literature, which in the comic dramatist and satirist Holberg suddenly attained to a noon-day brightness. Contemporary with Holberg were Falster, Snebøll, and Tullin. Though his productions were inconsiderable in number, Christian Falster acquired no small repute as a satirist, in which character he wrote in a still bolder and bitterer tone than Holberg himself, while as a poet he was certainly superior to him. His works went through several editions between 1730 and 1750. To Snebøll the language itself is greatly indebted for the example which he set of a pure, elegant, and graceful style. These qualities rendered his periodical, entitled *The Patriotic Spectator*, exceedingly popular. Tullin gave to poetry the charm of melody, ease, and richness; on which account, although not a poet of the first order, he may fairly be considered a master in the mechanical part of the art. In that respect he may be classed with Pope, and he also occasionally resembles the English poet in his moral strains.

We now arrive at a period of Danish literature, of its poetry especially, which may be designated as that of Evald, for he impressed upon it a character till then unknown, vivifying it by his own fervid genius. If Holberg was the founder of Danish comedy, Evald was the

creator of the national tragedy. Contemporary with Evald, his coheritor in indigence, his counterpart in many respects, his opposite in others, was Johan Herman Wessel, who, like Holberg, was a native of Norway, and like him possessed much comic talent and turn for humorous satire.

Before the close of the century a new school, at least a new generation, had begun to spring up. Baggesen made himself a favourite by his "*Comic Tales*," decidedly the best of their kind in the language; and, in his "*Labyrinth*," or Tour through Germany, Switzerland, &c., he produced the most admirable specimen of a prose style that the literature possesses. The fame of Oehlenschläger, a name now of European celebrity, may be dated from the first years of the nineteenth century, the poetical pieces by him which appeared in 1803 being almost the first of his published productions; and in the following year the first book of his modernized version of the "*Edda*," printed in Rahbek's "*Charis*." In his dramas and some other works he reopened the stores of ancient Scandinavian fable and mythology, and revived the olden spirit of his fatherland. Jacob Baden did much for the language by his Grammar, by his *Critical Journal*, and by various philological treatises which have become established authorities for idiom and style; and by his able translation of Tacitus. Less gifted than Baggesen, with more of industry and of tact than of superior talent, Rahbek raised himself also to an honourable place in Danish literature. It was as a journalist, critic, and literary historian, rather than as an original writer, that he commanded attention.

In other branches of literature Denmark has had several eminent scholars and men of science; and we may mention in particular those, as Rask, Stephensen, Sigurdsson, and others, who have shed so much light on Scandinavian and also on English antiquities, while in graceful poetical fiction the name of Hans Andersen must not be forgotten.

Sweden.—Though the modern literature of Sweden developed itself more tardily than that of Denmark, its course was nearly the same. The Scalds continued to recite their compositions at the court of the Swedish princes till about the middle of the thirteenth century, when the last Scald upon record was Sturle Thordson. For a long time Swedish literature is little more than a dreary blank. Even learning was scarcely cultivated, for though the University of Upsala was founded in 1478 it languished through neglect and for want of teachers, and can hardly be said to have been effectively established till the time of Gustavus Adolphus (1621–24).

Gustavus Adolphus was gifted with more than ordinary powers of eloquence, and his address to the States (1620) may be considered a model of that oratory. This prince began to compose his own memoirs, which are scarcely less admirable for their style than interesting for their matter. Inseparably connected with the name of Gustavus Adolphus is that of Axel Oxenstierna (1583–1654), a most eminent statesman and a warm patron of letters.

Joran or George Stjernhjelm, ennobled by Gustavus Adolphus, and patronized by Christina, had considerable reputation as a poet, in which capacity he furnished the court ballets or masques. Stjernhjelm also published the "*Codex Argenteus*," with a translation. His contemporaries Rosenhane and Spögel distinguished themselves—the one by his sonnets, in which he showed himself a disciple of Ronsard, while the other was an imitator of Du Bartas. Spögel also compiled a dictionary of the Swedish language, which was greatly extended by Ihre.

The commencement of the eighteenth century was by no means propitious to literature in Sweden. The age of laborious erudition had passed away, and that of the belles-lettres can scarcely be said to have begun before the reign of Gustavus III. Olaf von Dalin, the Swedish Addison, however, suffices to vindicate the national taste

at this period by his graceful and polished prose style. The *Svenska Argus* (begun in 1733, when the writer was only twenty-four) obtained as marked success as the English *Spectator*. Gustavus III. (1772-92), an illustrious patron of literature and art, was unfortunately prepossessed in favour of French models. Hence the literature of his time bears more of a French than a national physiognomy. Nevertheless much good was effected by an impulse being then given which afterwards took a better direction. Besides reorganizing the Swedish Academy of Stockholm (1786) Gustavus established several other institutions, and liberally supported the two universities of Upsala and Lund. From the commencement of his reign the names of literary persons begin to be numerous.

Among those literary men who enjoyed the favour of Gustavus were Bellman, full of racy humour and master of the bacchanalian lyric; Lidner, as sombre and plaintive as Bellman was gay; and Kellgren, full of ingenious and happily-expressed ideas, set off to advantage by the elegance and harmoniousness of his versification. Thorild, the literary antagonist of Kellgren, distinguished himself scarcely less as the zealous but unsuccessful champion of the liberty of the press than as a writer. The Baroness d'Albedyhl is noteworthy for "Gefion" (Upsala, 1824), a little epic poem in four cantos, and her elegant letters. Leopold (1756-1829), whose career extended through a long period, was looked up to as the leader of the classical or French school of literature, which was in fashion at the beginning of the present century. His tragedies are cold and declamatory, with little of real passion or poetry, though abounding with splendid rhetoric. The same may be said of his odes. He succeeded better in his tales and satires. As a prose writer he is deservedly considered as a model of style.

The beginning of the nineteenth century saw a distinguished group of poets, the chief of whom were Stagnelius, Vitalis, and Nicander, all of whom unhappily died young.

Among the later writers of Sweden are several who enjoy a high reputation. Franzen, Tegner, and Ling are eminent as poets; but Tegner is decidedly the poet of the nation, and also the first in the estimation of foreigners. The department of prose fiction or the novel is one that has been cultivated in Sweden only within the present century, but has been largely stimulated by the reproduction of the works of Scott, Bulwer Lytton, Dickens, and Thackeray. Among the more popular writers of this class are Frederick Cedersborg, Frederica Bremer, the Baroness Knorring, and Engerstrom. Of these Frederica Bremer has been popularized in England through Mrs. Howitt's admirable translations of her choicest fictions.

SCANDINAVIAN MYTHOLOGY. See NORSE MYTHOLOGY.

SCANSORES (Lat. *scando*, I climb) is the name of an order of BIRDS. This order is a provisional one and of uncertain limits. It forms a group, Zygodactyli, of the order Picariæ for some; and in it are also included by some authors the orders *Pittaci* (PARKITS) and *Pici* (woodpeckers). According to the arrangement adopted in the present work this order includes the families Musophagidæ (plantain-eaters and touracoes), Cuculidæ (cuckoos), Buceonidæ (puff-birds), and Rhamphastidæ (toucans). In this order the first and fourth toes are turned backwards (*zygodactyle*); the tarsi have broad scutes; the tongue is not extensible; the bill varies considerably in size, but is never arched from the base, and has no cere. As illustrations of this order there are figured in the Plate the green Touraco (*Corythæix persa*, fig. 1), the Common Cuckoo (*Cuculus canorus*, fig. 2), the Red-breasted Toucan (*Rhamphastos dicoloris*, fig. 3), and the Aracari (*Pteroglossus aracari*, fig. 4), which also belongs to the Rhamphastidæ.

SCAPHOID BONE (Gr. *skaphe*, a boat), the name given to two boat-shaped bones, one of which occurs in the wrist and the other in the tarsus of the foot.

SCAPHOPODA is a class of the sub-kingdom MOLLUSCA, with certain affinities with the GASTROPODA. In this class the shell is elongated, conical, tubular, open at both ends and tapering. Beneath this shell is a large tubular mantle. There is a long club-shaped foot, which can be protruded from the anterior extremity. The head is rudimentary, and the mouth is placed near the base of the foot at the extremity of an elongated cylindrical snout fringed with tentacles. At the base of the snout are disposed numerous filiform tentacles which are homologous with the pair of gills normally possessed by the Mollusca. The mouth leads into a chamber containing the *odontophore* or tooth-bearing tongue characteristic of all Mollusca except the Lamellibranchiata. A large bilobed liver is present. The stomach leads into an intestine which after one coil terminates behind the base of the foot, near the middle line, in an anus. There is neither heart nor distinct blood-vessels; but a colourless blood is contained in sinuses in the body cavity. A pair of kidneys are present, opening one on each side of the anus; into the right kidney the duct from the genital organs opens. The sexes are distinct. Four pairs of nerve-ganglia are present, connected by commissures. Eyes are absent. The embryo possesses a number of chitinous rings which subsequently disappear. The Scaphopoda feed on Foraminifera and minute bivalves; they are found on the sea-coast buried in the sand in depths of from 10 to 100 fathoms. About fifty recent species are known, contained in two genera, *Dentalium* and *Eutalium*. The fossil species are more numerous, dating from as far back as the Devonian epoch. Some of the native tribes of the North Pacific coast of America use the *Dentalium* shells as currency, just as cowries are employed elsewhere.

SCAPULA (the Latin name for the shoulder-blade), in anatomy, the bone which passes from the shoulder joint in a direction towards the vertebral column. It is a flat, broad, triangular bone, sometimes subquadrilateral in animals; narrow and straight in Saurian reptiles, narrow and curved in birds; strong, straight, and columnar in chelonian reptiles; of various forms, and generally attached to the back of the skull, in fishes. In the human subject it is divided into two unequal parts, the supraspinous fossa and the infraspinous fossa, by a crest of bone called the spine, which runs across the upper part of the neck of the scapula, and projects forward so as to form a sort of arch, known as the acromion process, which impends over the glenoid cavity, or receptacle for the head of the humerus or principal bone of the arm. The curious curved projection or ridge noticeable along the anterior border is termed the coracoid process, from its supposed resemblance to the beak of a raven (Gr. *korax*). The scapula connects the arm to the trunk, and shares in most of the motions of the arm, while it also acts as a defence to the chest from the extent of its flat surface. For illustrations of the scapula and further details as to its function see the article ARM and the accompanying Plate, ARM AND SHOULDER.

SCAPULARY (Lat. *scapula*, shoulder-blade), a stripe of some cloth stuff worn over the shoulders by the Roman Catholic clergy and laity. The scapulary of the Roman Catholic religious orders of both sexes varies in stuff and colour according to the order. It admits the head through the middle, and hangs down both front and back, reaching to the feet for monks, but to the knees only for lay-brothers. The fraternity of the Holy Scapulary is an entirely lay association, existing in honour of the Virgin, and bound by its rules to many religious and virtuous practices. It was founded in the thirteenth century by Simon Stock, an English Carmelite friar, and derives its name from the small scarf-like emblem worn as a reminder over the shoulders beneath the dress.

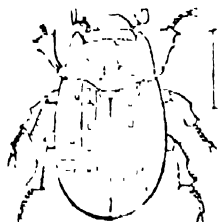
SCARABÆIDÆ is an extensive family of pentamerous BEETLES, forming with the family Lucanidæ (Stag Beetles) the group LAMELLICORNIA. The family is distinguished by the antennæ being terminated by a club composed of leaf-like joints. A great number of species belong to this family, the majority being natives of tropical countries; some are among the largest of beetles. The family is usually divided into eleven subfamilies. The subfamily Coprinæ (fig. 1) includes most of those which live in and feed on excrements. Many of them are large beetles adorned with rich metallic colours, and with the head and thorax of the male often adorned with curious horns. To this group belongs the Sacred Beetle of the Egyptians

Fig. 1.



Phanus pezarus.

Fig. 2.



Trox sabulosus.

(*Scarabæus sacer*). [See SCARABÆUS.] The DUNG-BEETLES (Gedrinidæ) are somewhat similar in their habits to the Coprinæ, excavating tunnels under the excrements of large animals, especially the herbivorous mammals, feeding on this substance and laying their eggs there. The Trogidæ (fig. 2) are oblong or oval insects of moderate size, living on dried animal substances on trees; most of them have rows of tubercles along the elytra. The COCKCHAPEERS (Melolonthinæ) live chiefly on the foliage of trees and plants. The Rutelina or Goldsmith Beetles contain beetles with polished metallic integuments, which in the case of several of the oak-feeding tropical American species glow like burnished gold. The DYNASTINÆ, common in tropical countries, are remarkable for the enormous horn-like processes with which the males are armed. The Cetoniinæ (ROSCHAELIÆ) is a group very rich in members, and remarkable for beauty of form and colour.

SCARABÆUS is the name of a beetle worshipped by the Egyptians. It is identified with one or two species

Sacred Beetle (*Scarabæus sacer*).

of the SCARABÆIDÆ. This beetle is frequently sculptured on the ancient Egyptian monuments. It was a type of the sun, and was used as a symbol of the spring of the world, and of the warrior. Its symbolical affinity to the sun it derived from the angular projections on its head, somewhat resembling the rays of the sun. The world it symbolized from the roundness of its balls, and from the beetles which they produced. The Egyptians believed that the beetles were all males, and hence it was typically symbolical of a courageous warrior. In the British Museum galleries, the *Scarabæus* is a frequent symbol on the monuments. Amulets in its form are frequently found associated with the mummies. These

beetles have a rounded body, flattened above, the hind legs elongated, and the tarsal joints short. They form round pellets of dung with their hind feet, and roll them into their burrows, which are excavated in a bank. Their object is not, as has been supposed, to provide food for their unborn progeny, for M. Faber asserts that these balls do not contain eggs, but simply to furnish food for themselves. The eggs, according to the same observer, are deposited in another way in the midst of a more succulent supply of excrement. *Scarabæus sacer* is a smooth black beetle about an inch long, found in parts of Southern Europe, Western Asia, and Northern Africa. This species is most common in lower Egypt, and is thought to be the beetle commonly represented on monuments, &c. Another species, *Scarabæus Egyptiorum*, larger and of a brilliant green with golden tints, is commoner on the Upper Nile, and is thought by some to be the species originally worshipped.

SCARBOROUGH, a parliamentary and municipal borough, fashionable watering-place, and seaport, in the North Riding of Yorkshire, is situated on a headland extending into the North Sea, on the North-eastern Railway, 42 miles north-east from York, and 187 miles from London by road, or 226 by rail.

"Scarborough the Splendid" was called *Scarburgh* by the Saxons, from a fort which preceded a Norman castle, built by William le Gros, on a limestone scarp or cliff projecting half a mile into the sea, at the edge of which, 300 feet from the water, are the picturesque keep, 97 feet high, and other remains, surrounded by modern ramparts and barracks. Well-built houses and elegant terraces, chiefly of stone, are scattered up and down the north and south slopes of the cliff, by which the town is sheltered from easterly winds. The main street, $1\frac{1}{2}$ mile long, extends from the castle towards Falsgrave. Agates, cornelians, and fossils are sometimes found on the beach and in the rocks near the town.

The parish church, once part of a Cistercian priory founded by Edward I. and a church with a tower 100 feet high, both stand below the castle. The borough also contains five other Episcopal churches, a Roman Catholic church, and there are Wesleyan, Independent, Primitive Methodist, Unitarian, and Quaker places of worship; a philosophical and archaeological society, with a museum of geology and natural history; St. George's Music-hall, assembly rooms; the grand hotel, nine storeys high, and containing 300 bedrooms; theatre, aquarium, mechanics' institution, town and market-halls, public libraries, a free grammar and various other schools; St. Thomas' and several other hospitals, including one for seamen, founded in 1752; a sea-bathing infirmary for poor invalids, almshouses, &c. In 1869 a splendid promenade pier was opened on the north sands. It is constructed of iron, and is about 1000 feet long and 23 feet wide.

Scarborough is now the most fashionable place for sea-bathing on the north-east coast, and the hotels, lodging-houses, and shops are large and handsome. The mineral waters, discovered in 1620, have long been in repute for their tonic and purgative qualities. They are obtained from springs on the sea-shore under a cliff, and contain sulphate of lime, magnesia, and oxide of iron. A wide chasm divides the Spa—which is the fashionable rendezvous, and is thronged with visitors during the season—from the rest of the town, but easy access to it is provided by the Cliff Bridge, an elegant cast-iron structure which has been thrown across the ravine at a height of 75 feet above the beach. This bridge rests on piers, and is more than 400 feet in length. In the neighbourhood of the mineral springs are extensive pleasure grounds, a saloon, music-hall, &c., and buildings for public entertainments were opened in 1880.

Scarborough harbour is the only one of any consequence between the Humber and Whitby, and is used as a place

of shelter from the easterly gales which prevail on this coast. It is a shallow artificial port between two piers, each 1200 feet long, and on one of which is a lighthouse, 58 feet high. Though of course confined at the entrance, it is easy of access, and safe and commodious within. In the bay outside—which is protected on the north-east by a high promontory—there is anchorage in 5 fathoms of water. The harbour is chiefly used for the fishing and coasting trade. The imports from foreign countries are very limited, but a few ships run to and from France, Holland, and the Baltic. The principal articles imported are currants, tea, coffee, wine, brandy, &c., but they are chiefly brought from London, and not direct from the countries of their production. Iron-founding, machine-making, and the manufacture of ornaments provide employment. The fishery, once a source of great profit to the town, has declined, but herrings are still caught in large numbers. There is now no shipbuilding, though at one time many of the inhabitants were employed in it.

The municipal borough is divided into six wards, and is governed by a mayor (who is returning officer), six aldermen, and eighteen councillors. The parliamentary borough formerly returned two members, but was deprived of one by the Redistribution of Seats Act of 1885. The population in 1881 was 30,504. In the neighbourhood are Robin Hood and Filey Bays, Hackness, and its old nunnery, with other objects of note or antiquity. It was to Scarborough Castle that Piers de Gaveston, the minion of Edward II., fled for refuge from the vengeance of the exasperated barons. The castle, after sustaining two sieges from the Parliamentary troops, was dismantled at the close of the civil wars. It was in one of its towers, now pulled down, that George Fox, the founder of the Society of Friends, was imprisoned in 1666.

SCARFING, the mode of joining two pieces of timber end to end in such a manner that they may appear but one, and cannot be pulled asunder by a force applied in the direction of their length, without breaking off part of the wood at the joint. The scarfed pieces are usually half-lapped or united by a zigzag ("flash of lightning") joint, and then bolted together.

SCARLATTI, father and son, are persons of great celebrity in musical history.

ALESSANDRO SCARLATTI, founder of the Neapolitan school of music and creator of modern opera, was born in Sicily in 1659, and completed his studies at Rome under Carissimi. At Rome and Venice Alessandro produced many compositions, both for the church and the theatre, with uniform success. One of his early operas was written for the eccentric Queen Christina of Sweden, and was played at her palace in Rome in 1680; and either then or soon after he became formally her director of music (*maestro di capella*). He finally settled in Naples in 1684, and became *maestro di capella* to the viceroy in 1694. He devoted himself to his art, the improvement of which was his most anxious wish. He produced, we are told, 200 masses, 115 operas, and many hundred cantatas, and was author also of the words of many of these latter. From 1703 to 1709 he worked at Santa Maggiore at Rome, but returned to Naples. He died at Rome in 1725. He was knighted at Rome by Queen Christina, received the order of the Golden Spur, and was a Knight of Malta.

DOMENICO SCARLATTI was born at Naples in 1683. He inherited the prudence as well as the talent of his father; and as the parent had profited much by his connection with so great a master as Carissimi, so the son derived at least equal advantages from his acquaintance with Handel, whose friendship he acquired while both were residing at Venice and Rome in 1708. They met again in London in 1720, and Handel always spoke of his friend with the greatest respect. From 1715 to 1719 Domenico Scarlatti directed the music at St. Peter's at Rome. After

various changes, he accepted, in 1729, an invitation to Madrid as master of the royal chapel and teacher to the queen, who had been his pupil at Lisbon. He returned to Naples in 1754, and died in that city in 1757.

Domenico left many operas and other compositions; but his forty-two "Suites de Pièces pour le Clavecin" is the work by which he is now known, and on which his reputation mainly rests; in fact, Domenico Scarlatti created the school of the harpsichord, as his father had created the form of the opera aria and overture, and other operatic forms. Domenico Scarlatti left a son, Giuseppe, born at Naples in 1712, who composed some harpsichord music and many Italian operas, all of which were popular in their day. He died at Vienna in 1777.

SCARLET FEVER, the name given to an infectious specific fever of the eruptive class [see **FEVER**], which affects all classes and periods of life, but which is specially common and dangerous among young children. The name is synonymous with *scarlatina*, though in popular language the latter term is employed when the symptoms of the disease are of a mild character, scarlet fever being used when they are of greater severity. The great cause of this disease is contagion, one person suffering from this disease becoming readily a centre of infection for others, and though the mode of communication cannot always be traced, there is good reason to suppose that it is solely by means of some product of the sick that the disease is maintained and spread among the community. The signs following the reception of the specific poison of the disease are usually, feelings of languor and uneasiness, aching of the head and limbs, delirium at night, sore throat, vomiting, and there is a marked rise in temperature, with a rapid pulse. Soon effusion of the eyes, flushing of the face, and great heat succeed, with thirst, pain in swallowing, and some stiffness of the neck. If the throat be examined the back of it will be found red and swollen, and the tonsils enlarged. The tongue is furred at the centre and red at the edges and tip, the latter portion, owing to the projection of the papillæ, often resembling a strawberry in appearance, so that "strawberry tongue" has become one of the recognized signs of scarlet fever. Usually on the second day of the illness, but often earlier or later, a scarlet efflorescence, somewhat similar to the colour of a boiled lobster, appears on the neck and chest, from whence it soon spreads to the trunk and limbs. When the skin is pressed upon or put upon the stretch the colour fades, and owing to the excessive contractibility of the capillaries any hard body, such as the finger nail or a penholder drawn across the red patch, leaves a white line which remains for a minute or two before disappearing. The rash reaches its maximum degree of intensity in three or four days, and then begins to fade, and usually by the eighth or ninth day it has completely disappeared. In favourable cases with the fading of the rash the other symptoms begin gradually to subside, and in a few days the patient begins to feel tolerably well. With the subsidence of the rash, however, another symptom, the desquamation or peeling off of the skin, makes its appearance, beginning with the chin and sides of the neck, where it is removed in the form of dust and small scales, and proceeding to other parts of the body; the thick epidermis of the fingers and soles of the feet peeling off in large flakes or in casts. New cuticle is rapidly formed during convalescence, and is more than once cast off and renewed, and sometimes several weeks elapse before the skin is perfectly free from any sign of the process.

The symptoms of this disease vary much in severity, some cases being of so slight a character that it is not until the skin begins to shed that the true nature of the attack is suspected, while occasionally cases are met with in which death from collapse ensues before even the characteristic rash has had time to appear. Several varieties of the disease are recognized, as *Scarlatina simplex* or *benigna*,

In which there is only a slight fever and rash, the throat being little if at all affected; *Scarlatina anginosa*, when the affection of the throat forms the most prominent symptom; and *Scarlatina maligna*, which is marked from the first with high fever and all its attendant consequences. The complications and *sequela* of scarlet fever are numerous and often of a serious character. In the progress of the disease the throat may suppurate and the discharge cause death through exhaustion or blood poisoning, or the ulceration may spread to the nostrils and along the Eustachian tube, causing an offensive discharge from the nose and ears, and followed by the destruction of the tympanum and permanent deafness. The kidneys are invariably affected by this disease, and it is necessary that frequent examinations of the urine be made in order that their condition may receive due attention and the setting up of a chronic disease be prevented if possible. Rheumatism is frequently induced by scarlet fever, the pain being observed in several of the joints just after the rash is fullest, the appearance of the rheumatic pains being often also attended by an increase of the feverish symptoms. Lung disease is occasionally set up during scarlet fever, and sometimes there is inflammation of the membranous covering of the heart or pericarditis. The disease is generally lighter in adults than children, and it has been observed that two-thirds of all the deaths from it occur in the first five years of childhood, the rate for all ages over fifteen being less than 5 per cent.

In the treatment of this disease attention must be directed as much to the prevention of infection as to the welfare of the patient. Directly the disease is suspected the patient should be isolated as much as possible, and when the disease has become manifest careful preparations must be made to avoid the spread of the poison. The danger is least, perhaps, in the first day or two of the disease, but it is certainly present in a greater or less degree during the whole period of illness and recovery. The room of the patient should be emptied of *everything* not absolutely necessary, and it should be provided with a curtain over the door to be kept constantly moistened with a solution of carbolic acid. The windows should be kept open, direct draught being avoided, as a plentiful supply of fresh air is not only beneficial to the patient, but is also one of the best means of lessening the danger of infection. A basin of water, made pink with permanganate of potash (Condy's fluid), should be kept ready, in which to dip the fingers or anything used by the patient, a stronger solution of this, or some other disinfecting material, being used to immerse the body linen, handkerchiefs, &c., and to receive the evacuations. The hair of the patient should be cut short, that which is cut off being burned, and he should be kept perfectly clean by the use of the tepid bath, or tepid sponging over the whole body, part at a time, once or twice in the twenty-four hours. After washing, the skin should be anointed with ordinary olive oil, to which a little carbolic acid has been added, or camellidated oil may be used for the same purpose. This will subdue the irritation of the skin, which is often very intense, and it is an important means of preventing the dead skin from coming off into the air as dust or scales. No medicines will cut short scarlet fever, but simple salines, as acetate of ammonia or chloride of potash, given in plenty of liquid, tend to mitigate its symptoms by acting slightly upon the skin and kidneys. Iced water or the sucking of small pieces of ice may be used to relieve the throat symptoms, or the opposite plan of inhaling steam may be adopted by adults. Warm compresses or linseed poultices may be found useful for the same purpose, and a warm poultice held up close to the ear will relieve pain in the tonsil. In cases of high temperature the most effective and suitable remedies are digitalis and quinine.

The diet at first must be limited to liquids, afterwards eggs, beef-tea, and fish or fowl may be used, and lemon

juice, oranges, or grapes may be used to advantage in rheumatic or renal complications. During recovery the patient should carefully avoid taking a chill, and should remain in doors until fully recovered. Warm baths on three or four successive days, with plenty of soap to remove all roughness of skin, and fresh clothing are required before leaving the sick room. No convalescent should mix with susceptible children until six weeks from the seizure, however slight the attack; if convalescence has been interrupted by the appearance of some of the after effects of the disease, this interval has to be two or three weeks longer. Those with the sick should wash their hands after assisting the patient, and change their outer dress on leaving the sick room. After recovery has taken place the clothes and bedding should be disinfected by stoving, and the sick room, after being thoroughly fumigated with sulphur, should be well scrubbed, re-painted, re-papered, and whitewashed. It is absolutely necessary that these precautions should be taken, for the contagious matter preserves its vitality for a long period, and the smallest quantity may induce an attack of the disease.

SCAR'PA, ANTONIO, an Italian anatomist, born at La Motta, a village of Friuli, 13th June, 1747, died in Pavia, 31st October, 1832. He was educated at Padua, in 1772 became professor of anatomy in the University of Modena, and in 1783 at Pavia, and in 1811 director of the faculty of medicine. His principal works, in which surgical anatomy was first clearly developed, illustrated with engravings which are among the most exact and elegant of their kind, have been translated into many languages.

SCARPAN'TO, the modern name of the island of *Carpauthos*, belonging to Turkey, which lies between Rhodes and Crete, from the latter of which it is distant 60 Roman miles, according to Pliny (iv. 20). It is 32 miles long and 8 broad, and has several harbours—the largest, Porto Grande, being on its west side. The surface is mountainous, and iron and marble are the chief products. At its north extremity is the village of Scarpanto. The population is about 5000, who are mostly employed as carpenters and workers in wood. We know scarcely anything of its history. It is mentioned by Homer (*Iliad*, ii. 676) under the name of Krapathos, and is spoken of by Pliny (v. 86) as one of the Rhodian islands. Strabo (x. 489, Casaub.) describes it as lofty and 200 stadia in circumference, and says that it contained four towns, one of which was called Nisyros. The sea between Rhodes and Crete was called the Carpathian Sea, from the name of the island.

SCAR'RON, PAUL, was born at Paris in 1610, and by a family arrangement was compelled to enter upon an ecclesiastical life, for which his character and habits were ill suited. For some years he pursued a loose and irregular career. The current tale goes that his gay life was suddenly closed at the age of twenty-seven by the result of an act of gross indecency during the carnival at Mans. He and three companions covered themselves with honey, then rolled themselves in feathers, and thus appeared in public: the populace assailed them, and to escape they jumped into the Sarthe. The others died in consequence of this adventure; and Scarron himself contracted maladies from cold and exposure which rendered him for the rest of his life, to use his own phrase, an abridgment of human suffering. There seems no reason at all to believe this; but rather to take his own account, that he suffered from the effects of the ignorance of his physicians, who knew not how to treat him for rheumatic fever, and consequently crippled him for life. His body was ruined, but his spirit was untamed. In 1652 he became acquainted with Mlle. d'Aubigné (afterwards Madame de Maintenon), whom he subsequently married. Chastened by her influence, the society of his house, always a favourite resort of the wits, became still more select and brilliant. Meanwhile his fortune became smaller and smaller; for on his marriage he

had lost a canonry with which he had been presented, and his other chief dependence, the profit arising from the sale of his works, diminished greatly towards the end of his life. This, however, like all other evils, he bore with unchanging gaiety; and his last days were only troubled by anxiety for the prospects of his wife. He died on the 14th of October, 1660.

His collected works have been published in various editions. The chief of them are, "Virgile Travesti," very clever, if we admit the propriety of such things; "Le Roman Comique," the most lasting of his works, and the original from which the idea of "Gil Blas" was taken by Lesage, known to Englishmen also through the nervous translation of Oliver Goldsmith; "Nouvelles Tragicomiques," "Ode Burlesque," "La Mazarinade," his letters and his comedies. Scarron was immensely popular as a comic dramatist; the character of Jodelet in his play of the same name was proverbial at the time, and set up as a recognized type. Other comedies of his of great popularity were "L'Héritier ridicule" and "La Précaution inutile." Molière was not unobservant of the productions of Scarron, as may easily be detected by the careful student.

SCA'RUS. See PARROT-FISH.

SCAUP DUCK (*Fuligula marila*) is a species of scaup-ducks belonging to the subfamily *FULIGULINÆ*, and to the same genus as the POCHARD. The scaup duck is a winter visitor to Britain, appearing about the end of October. It breeds in the arctic and subarctic regions in both hemispheres. In winter it migrates to the coasts and inland waters of Europe, North America, and Asia, reaching as far south as Egypt, Northern India, and the West Indies. In this country the scaup duck is common in small flocks on low, flat portions of the coasts, and is rarely seen inland. It is an expert diver, and by this means secures most of its food, which consists of small fish, molluscs, water insects, and water plants. The length of the scaup duck is about 18 inches. In the male bird the head, neck, and the upper part of the breast and back are black; the cheeks and sides of the neck are glossed with rich green; the rest of the back is white, spotted, and striped with black lines; the wing coverts are dark gray, the primaries brownish-black, the secondaries white, tipped with black, and the tertiaries dark gray; the breast and sides are white; the rump and tail are black; the tail is pale blue, and the legs bluish-black. The female is nearly as large as the male, but differs considerably in colour; the head and neck, and the lower part of the breast are dark brown, the upper light gray; the bill lead colour, with a broad band of white around its base.

The flesh of the scaup duck is coarse and fishy as a rule, but in parts of the United States, where it feeds on the fresh-water *Vallisneria*, it is said to be good.

SCÉAT'TA and **STYCA**, the first national English coinage after the departure of the Romans. The first was a silver, the second a copper-piece; and both seem to belong to the Anglian kingdom of Northumbria exclusively. They are of the rudest manufacture, and have neither of them any inscription; they are marked with a rough profile of the ruler, or a bird or other device, and also a few marks whose signification has not as yet been ascertained. The *scæatta* and *styca* were succeeded by the silver penny (1-240th part of a pound, as it was originally meant to be), and this latter continued the sole currency down to the reign of Edward III.

SCEPTICISM. The Sceptics (more correctly *Skeptics*, from the Greek *skeptomai*, to inquire) were a school of Greek philosophers founded by Pyrrho (*Purrhôn*) in the Alexandrine era, at the beginning of the third century B.C., whose main distinctive peculiarity was a profound scepticism or critical attitude towards all speculative philosophy whatever. It is certainly extraordinary that Pyrrho, who doubted and set aside all speculation as use-

less, was universally respected as grand-priest of Elis, and lived to a good age, while a little over two centuries before, Socrates, who only doubted in order that he might by inquiry arrive at knowledge, had been so badly treated and at last put to death. The Sceptics were never a numerous body: the attitude of refined intellectual contempt fortunately does not suit many minds: it is to philosophy what atheism is to religion, and implies a serious mental defect, akin to blindness. But as this defect is not peculiar to any age, the Sceptics as a school lasted many centuries, and were always an important element to be reckoned with.

The aim of ancient philosophy was the discovery of truth, the *why* of the universe; and the Sceptics did some service in showing the futility of the inquiry. They asked how knowledge was possible, and were answered that it was by the study of appearances (phenomena); and then, when they rejoined that there was no criterion to test these appearances, that no means existed of knowing whether a green apple was really green or was really an apple, they got no intelligible or logical reply. Consequently they triumphantly decided that no knowledge was possible.

The modern philosophical view which aims at the discovery of law, and which seeks the *how*, and not the *why* of the universe, was of course beyond the ken of the Sceptics. We should be more than content if only we could some day arrive at a complete co-ordination of phenomena, and should consider it a very substantial gain to knowledge. The position of the Sceptics was this. Since absolute truth cannot be known, no knowledge is possible. The true position is this: although the absolute in any of its forms cannot be known, the relative may be; the infinite is beyond our grasp, but the finite may be classed and grouped and understood; final causes are unknowable, but cause and effect can be accurately discovered; and this knowledge will be all that is necessary for us to act upon, though it is a phenomenal and not an absolute knowledge. It is worthy of note that all the arguments of modern sceptics are in essence repetitions of the arguments of the Pyrrhonites: they differ in form rather than in substance. We know these main positions of the Greek sceptics from Sextus Empiricus, a physician of this school, who wrote in the third century of our era: over 500 years after Pyrrho. The entire movement must be divided into three periods:—(1) Pyrrho and his disciples, Philo of Athens, Nausiphanes of Teos, and the most eminent of them all, Timon of Phlius. (2) The New Academy, the chiefs of which were Arkaschos and Carneades, who immediately succeeded the former, and who attacked rather the dogmatism of the Stoics than the possibility of knowledge. These men differed chiefly in admitting a theory of probability to temper the blank denials of Pyrrhonism. (3) The revival of the rigid sceptical attitude (when the New Academy had gone over to eclectic dogmatism) by Ainesidemus at Alexandria in the first century of our era. He prepared eight books of Pyrrho's discourses which are now lost, but of which an abridgment exists; and he enumerated the ten famous sceptical tropes. The first was founded upon the diversity of classes in animated nature, so that no two could possibly be considered to apprehend phenomena alike; the second rested on the diversity of men among themselves; the third on the conflict of the diverse senses in each individual; and so on in ever-narrowing divisions. Agrippa Sextus Empiricus (about 200 A.D.), Favorinus, and Aulus Gellius were famous members of this school in its later development. Some of the extreme positions of the Sceptics are mere absurdities; such as the often-quoted dicta, "We assert *nothing*—not even that" (namely, that we assert nothing); and "Everything can be directly contradicted, including also these contradictions themselves."

The great feature of the sceptical attitude is that it maintains that every proposition requires a prior proposition to

support it, and so on *ad infinitum*; or else it assumes some axiom which cannot be proved, and is to be taken for granted without demonstration, and consequently may be denied with the same force with which it is assumed. Further, that nothing can be known by means of itself nor by means of something else while that other remains unknown, and that other must either be unknown or known by means of something else, and so on *ad infinitum*. This last is extremely subtle, and in itself is irresistible; but, as Kant remarked, there is this fundamental flaw in absolute scepticism, "that it gives out everything for appearance. It therefore distinguishes appearance from truth, and of course must have a mark of distinction: consequently it presupposes a knowledge of the truth, thus contradicting itself."

The abnegation of man's proudest faculty, reason, the perpetual indecision on every point, so little accords with the fertile and vigorous activity and creative power of the mind, that the real professors of scepticism have been universally indolent, easy-natured, sensual men, with whom the speculative doubting was stimulus enough.

Modern scepticism (summed up in the irony of Hume) is little from the ancient, and whatever strides philosophy may have taken in other departments, it has made little or none in that of doubt. Glanville, the author of "Scep sis Scientia, or Con fess t Ignorance the way to Science," is the systematic sceptic of the seventeenth century, and his work is altogether a curiosity. Its author was a member and a lecturer of the Royal Society, and published a book in favour of witchcraft. Montaigne and Bayle are also celebrated modern sceptics, but neither put forward any new theory. Locke in the clearest possible way, anticipated the main point of both Berkeley and Hume, but did not elaborate it.

Hume is the greatest modern sceptic. His attitude ironically assumed to be that of genuine Pyrrhonism. He attacked the very foundations of our knowledge by contrasting with them their self-contradictions. Berkeley, sometimes very inaccurately considered to be a sceptic, and ranked with Hume in the position assumed for the purpose of argument by the latter, was sincerely and *bona fide* an Idealist. Hume accepted Berkeley's argument that it was impossible to prove external reality, but he went still further; after denying a provable *substantive world* (consciousness being concerned only with ideas or representations), he denied on the same ground the possibility of proving a *substantive mind*. For, he asks, as we know but impressions and ideas, how can we know that there is anything more than these? For a fairly complete summary of his argument see the article HUME. The extraordinary and many-sided way in which Hume's quite irrefutable position has been misrepresented, is distressing to contemplate. The only solution is that those who attack him have not read him. Hume distinctly said, "The sceptic still continues to reason and believe, even though he cannot defend his reason by reason; what he overthrew was the possibility of verifying transcendental knowledge, not the existence of all things or thoughts outside ourselves. The latter would be the contention of an idiot and an atheist, and Hume was an exceedingly clever man and a believer in God."

SCEPTRE (*Gr. $\sigma\kappa\epsilon\pi\tau\rho\alpha$*), a staff or rod carried by princes as a sign of power. Both in the Old Testament and in Homer the most solemn oaths are sworn by it. The sceptre, as a symbol of royalty, is of greater antiquity than the crown. Tarquin the Elder first assumed it among the Romans.

SCHAD'OW, the name of a family of German artists of considerable celebrity. JOHANN GOTTLEB SCHAD'OW (1764-1850), sculptor of Berlin, was one of the first sculptors to return from the idealism of Canova. Thorwaldsen, Dannecker, &c., to the faithful, if ever realistic, style of the best period of the Renaissance. His monuments of Count von der Mark, in the Dorothea-Kirche at Berlin, of

Blücher at Rostock, and of Frederick the Great at Stettin are his best works. From 1822 till his death he was director of the Academy of Arts at Berlin. His sons, Zeno Ridolfo or Rodolph (1786-1822) and Friedrich Wilhelm, both also attained eminence in sculpture.

FRIEDRICH WILHELM VON SCHAD'OW-GODENHAUS, son of Johann Gottfried, is, however, still more famous as a painter than as a sculptor, and more famous as a teacher than as an executant. He exercised enormous influence over the current of artistic tendencies in Germany. Born in 1789, he went to Rome as a young man and enthusiastically joined the great school of German art there with Overbeck, Cornelius, &c., working both alone and with them on large religious pictures. He embraced Roman Catholicism at this time. On his return to Berlin in 1822 he was appointed professor of painting in the academy of which his father had just become director, and gathered a brilliant group of pupils around him. In a short time Cornelius, who had founded the famous school of Düsseldorf in 1822, and raised it to the leading position in Germany, desired to leave it for work at Munich, and Schadow was immediately appointed (1827). His best pupils, Lessing, Hildebrandt, &c., followed him to Düsseldorf. A vast amount of work has since been produced on the lines of the Overbeck-Cornelius school, strictly followed by Von Schadow. It is not too much to say that, roughly speaking, the general tone of art-work in Germany is due to the continuous influence of this renowned academy. One of Von Schadow's best and best known pictures is the "Wise and Foolish Virgins" at Frankfurt in the Stadel Institute, and another work of his, the "Four Evangelists," is regarded as among the finest productions of the period. Von Schadow died in 1862. He was ennobled by the King of Prussia in 1816 under the title of Von Schadow-Godenhaus.

SCHAFFHAU'SEN, a canton of Switzerland, intersected by the Rhine; it is of very irregular shape, and has a rugged surface, much broken by ramifications of the Jura; it is well watered by the Rhine and numerous small tributaries; grows all the ordinary cereals and hemp and flax in abundance, and in many of its sheltered spots it is well adapted for the vine. Most of the inhabitants are Protestants and well educated. The area is computed at 118 English square miles. The population in 1880 was 38,348.

SCHAFFHAUSEN, the capital of the above canton, is built on the side of a hill sloping to the right bank of the Rhine, and is about 1200 feet above the sea. It is 23 miles north-east of Zurich, is surrounded by old walls flanked with towers, and is also defended by the old citadel of Munoth, supposed to be of Roman origin. The streets are irregular, and most of the houses are old-looking, but many are modern and handsome. The most remarkable buildings are—the minster (founded in 1052), the town-house, and the arsenal. Schaffhausen has a college, a gymnasium, elementary schools, an orphan asylum, and several other public establishments. The town library contains the collection of books which belonged to the historian Müller, who was a native of this place. The population of the town in 1880 was 12,000. It is a principal dépot for goods passing between Switzerland and Germany, and Basel and Zurich, consisting of silk, cotton, and woollen goods, raw cotton, colonial produce, and Swiss cheese, and has manufactures of iron-ware and silks. It was originally a hamlet of boatmen, and a place for unloading the goods which came down from the Lake of Constance by the Rhine, the boats being obliged to stop here on account of the fall of Schaffhausen, a cataract of the Rhine, 3 miles S.S.W. of the town, which has a total descent of about 100 feet, and is justly considered one of the most imposing phenomena of its kind in Europe.

SCHAM'YL (i.e. *Samuel*), the warrior-prophet of the Caucasus, was born at Himry, in Daghestan, in 1797, and when only twenty-seven was already leading an insurrection

against the Russians. He succeeded Hamed Bey in 1834, as Imam of the Lesghians, fanatical Mohammedans of the Sufi sect, and for half a century he contended against the whole force of Russia with wonderful skill and heroism and strangely varying fortunes, until his power was completely broken by the downfall of the fortress of Weden, 12th April, 1859. Schamyl surrendered to General Baratinsky at Ghunib, 6th September, 1859, and was sent to St. Petersburg. He took the oath of fidelity to the Czar Alexander II. in 1866, and was then liberated under surveillance. He died in 1871.

SCHAUMBURG. See **LITRE**.

SCHÉELE, KARL WILHELM, a Swedish chemist, born in Stralsund, Pomerania, 19th December, 1742, died at Köping, near Stockholm, 21st May, 1786. In 1777 he was appointed by the medical academy apothecary at Köping. With the exception of Priestley he probably discovered more new substances than any other chemist, including tartaric acid, manganese, chlorine, barytes, the pigment called Scheele's green, and the colouring principle of Prussian blue. In his "Chemical Observations and Experiments on Air and Fire" (Stockholm, 1777; translated into English by Kirwan), with no knowledge of the previous discovery of Priestley, he described oxygen under the name of "empyreal air."

SCHÉELE'S GREEN is a green pigment obtained by precipitation from solution of cupric sulphate by the addition of potassium arsenite. It is an arsenite of copper, having the formula $\text{Cu}_4\text{As}_2\text{O}_5$, and is soluble in ammonia, forming a colourless solution. A much finer colour is obtained by substituting cupric acetate for the sulphate; it is called Schweinfurt green, and is aceto-arsenite of copper ($3\text{CuAsO}_2 \cdot \text{C}_2\text{H}_3\text{CuO}_2$). It is much employed for staining wall-paper. Both compounds are very poisonous, but there is great difference of opinion as to the deleterious effects of the paper when used for the walls of dwelling-houses. It is certain, however, that the workmen engaged in the manufacture of these compounds do not suffer in health in consequence.

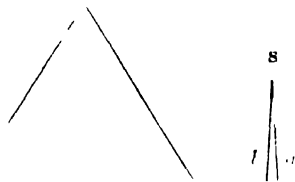
SCHÉE' MAKERS, PETER, the sculptor, was born at Antwerp in 1691, and came to England in 1728, where he at once obtained considerable employment. The time of his death is not known, but according to his pupil Nolletens, as related by Smith, he returned to Antwerp in 1770, and there soon after died. Scheemakers' works are very numerous; they are elaborate in design and costume, but rather effective than grand. There are several monuments by him in Westminster Abbey. The bronze statues of Guy in Guy's Hospital, and of Edward VI. in St. Thomas' Hospital, are his works. He executed also some busts and many other sculptures for the gardens of Stowe.

SCHÉFFER, ARY, an illustrious painter of the modern French school, was born at Dort, 10th February, 1795. His mother was a native of Dort, his father a German. Schéffer (who lost his father when still only a boy) was educated at Lille, from whence he removed to Paris in 1811, and became the pupil of Guérin, one of the adherents to the new naturalist school, which had risen in opposition to the absurdities of the classicists. He first attracted public notice in 1819 by his picture of "Les Bourgeois de Calais." An Orleanist in political principles he was patronized by Louis Philippe, and became the tutor of his children in 1826. In 1830 he was sent as messenger to the duke, on the abdication of Charles X., and eighteen years afterwards he handed the king into his carriage on his flight from Paris. As he advanced in years he gradually idealized his style, and some of his finest works were produced after he had attained the age of fifty. His finest compositions are—"Francesca di Rimini," "Le Christ Consolateur," "Dante and Beatrice," "Scenes in Goethe's Faust," "Ruth and Naomi," "Les Gémissements," "Gaston de Foix found Dead," and "The Angel announcing

the Resurrection of Jesus." Schéffer has always been popular in this country, and engravings of his best works are always in demand. Ary Schéffer died in 1858. A life of him was published by Mrs. Grote in 1860.

SCHEHALLIEN EXPERIMENT. This famous experiment, to investigate the truth of the theory of gravitation and to test the assumed mean density of the earth, was carried out through the liberality of King George III. The Schehallien Mountain is close to Loch Tay, in Scotland; it ranges east and west, and affords facilities for astronomical observations on both the north and south sides. It was argued that if the theory of gravitation were true, the attraction of a large, partly-isolated mass of earth like a mountain must be so great as to be able to be demonstrated; and hence some measure of the density of the whole earth might be obtained.

The method followed was this:—By the zenith sector (a swinging telescope with a plumb-line attached) and a graduated arc, a star may be observed somewhere near the zenith, and the inclination of the telescope with the actual zenith, as shown by the plumb-line, can then be measured. Theoretically all plumb-lines point to the centre of the earth, and a forest of plumb-lines placed along any meridian or great circle of the earth would radiate outwards like the spokes from the axle-tree of a wheel. An easy calculation further shows that the direction of the plumb-line changes 1 degree for every 100 feet, or a trifle less, that we step forward in any direction along the surface of the earth. Now the same star was observed both on the north and the south side of Schehallien, and the deviations of the telescopes from the vertical, as shown by the plumb-lines, was noted. It was found that the angle formed by the two plumb-lines (supposing them to be produced towards the centre of the earth till they met) was 53 seconds. But it appeared upon very exact measurement of the horizontal distance between the two observing stations that theoretically this distance accounted only for 41 seconds of change in direction of truly vertical plumb-lines. It became manifest, therefore, that each plumb-line had been drawn from the true vertical towards the mountain until the angle between the two plumb-lines had been increased by 12 seconds. Thus, if the north and south observations



be represented roughly by the above diagram, the true verticals at *a a* have been drawn in towards *b b* to the extent of 12 seconds between the two.

Then the fact of gravitation being thus demonstrated, viz., that it is simply masses of earth which attract, and not merely some subtle unexplainable power situated at the earth's centre, the next step was to measure the density of the earth. It was found that the pull of the mountain on the plumb-lines was about 5-9ths of the known pull of the whole earth, therefore it was argued the mean density of the whole earth should be as 9:5 of the density of the mountain. The rocks comprising the latter being most accurately measured and weighed, were found to be a little over $2\frac{1}{2}$ times that of water, giving the mean density of the earth as a whole as close upon 5 times that of water, a result well agreeing with that which Clairaut found from assuming a certain defined increase of density in the strata as they neared the earth's centre, and also with the observed variations of gravity and ellipticity of the earth.

SCHEIBLER, JOHANN HEINRICH, one of the founders of modern acoustics, was born near Aix-la-

Chapelle, in 1777, and died at Crefeld, where he had long been engaged as a silk manufacturer, in 1837.

Scheibler's most valuable aid to musical theory was in the form of delicate investigations in tuning, which began in 1812, and ended only with his life. He wished to produce pure musical intervals for the equally tempered scale, and after repeated failures with the monochord, liable like all stringed instruments to variation through heat and moisture, he took to tuning forks. He tuned with infinite trouble a set of fifty-two forks (now lost), each differing by a small equal interval from its neighbour, measured by counting the beats when two adjacent forks were sounded together. Another set, of fifty-six, each differing by four beats, is fortunately in existence, and this proceeds from 220 to 110 vibrations a second, by the small steps mentioned (four beats a second). When tested a few years back by Mr. A. J. Ellis, the chief authority on the subject, this set was found to be substantially accurate, though errors occurred here and there. Particulars of the fifty-two (lost) set, and also of Scheibler's other musical investigations, are given in his somewhat famous pamphlet, "*Der Physikalische und Musikalische Tonmesser*," &c. (with plates, Essen, 1834), the full title being "*The Physical and Musical Tonometer*, which makes evident to the eye by means of the pendulum the absolute vibrations of tones, and of the principal varieties of combinational tones as well as the most precise exactness of equally tempered and mathematical chords, invented and executed by Heinrich Scheibler, silk manufacturer, in Crefeld." This pamphlet and the tonometer it described at once raised Scheibler to the position of an authority on the subject of pitch; and at a congress of physicists at Stuttgart in 1834, Scheibler proposed as a universal pitch $A = 440$ vibrations per second, at 60° Fahr. (or 440.2 at 50°). This gives $C = 528$, and enables the whole scale of C (in just intonation) to be expressed by whole numbers, though that was not (as is often said) Scheibler's reason for selecting it. He only took it as the nearest "round number" to a medium pitch obtained by taking the average of pitches in actual use. This pitch, called Scheibler's pitch, or Stuttgart pitch, is to this day one of the favourite musical pitches. It is almost precisely midway between the Society of Arts pitch (441) and the French Dupuis Normal (435).

Scheibler's method has been improved upon, but his idea of fixing tones by a large series of counted forks, each differing by (say) four beats, is now of universal application, as it is found to give the only really satisfactory and permanent tone-measure known.

SCHELDT, THE (pronounced *Stelt*; Fr. *L'Escaut*; Lat. *Scheldius*, a river of Holland, rises in the French department of Aisne, and flows northward by the important cities of Cambrai, Valenciennes, celebrated for its lace manufactures, Boullam, once captured by Marlborough; and Condé, to cross the frontiers of Belgium, whence it proceeds by way of Oudenarde, Ghent, and Rupelmonde to Antwerp. Here it broadens and deepens into a noble river, capable of floating vessels of heavy tonnage, and pursuing a north-westward course to the Isle of South Beveland, in the Netherlands, divides into two branches. The southern, the Honte or Wester Scheldt, strikes to the west across a level and marshy country, and enters the sea at Flushing. The northern, the Noorderk, flows between Zealand and North Brabant, and near Bergen-op-Zoom is re-divided into two channels, one of which, the Easter Scheldt, finds an exit into the ocean at the ancient *Romanorum Portus*, the modern Roospot; the other, after traversing Zeeland, spreads into numerous arms, and encircles many islands. The whole course of the Scheldt is 248 miles.

The navigation of the Scheldt to Antwerp was formerly much restricted by the heavy duty which the Dutch government levied on foreign ships. By a treaty concluded at Brussels, 16th July, 1863, this vexatious monopoly was

swept away, and a money compensation paid by the various countries interested in its abolition. The sum paid was £750,000, of which the House of Commons voted £175,650 for the British portion.

SCHELLING, FRIEDRICH WILHELM JOSEPH VON, one of the most celebrated and productive philosophers of Germany, was born at Leonberg in Wurtemberg, in 1775. He was the son of a country clergyman. Such was the precocity of his genius, that he entered the university of Tubingen in his fifteenth year. Here he formed a close intimacy with Hegel, afterwards his great rival in philosophy [see *HEGEL*], although in principle their systems have much in common. At the age of seventeen, with the view of taking the highest honours in philosophy, he published a Latin dissertation on "*The Origin of Evil as laid down in the third chapter of Genesis*." He remained at Tubingen until 1795, when he published an inaugural dissertation in theology, entitled "*On Marcion, the corrector of the Pauline Epistles*." He then went to Leipzig, where he resided for a short time as tutor to the Baron von Kriesel. From Leipzig he went to the University of Jena, where he became Fichte's devoted disciple, and in 1798 he succeeded Fichte as professor of philosophy at Jena. Here he lectured with great success until 1803, when he was invited to fill the chair of philosophy at Wurzburg. Having been ennobled by the King of Bavaria, he removed to Munich in 1807, and remained there until 1811. During part of this time he discharged the duties of a professor in the university of Munich (founded in 1827), and after Jacobi's death he was appointed president of the Academy of Sciences. He resided for some time at Erlangen, where he delivered a course of lectures. In 1811 he was summoned to the University of Berlin to lecture against Hegelianism, which was then carrying everything before it. If Hegel's reign is over, it cannot be affirmed that Schelling had much share in deposing him. His lectures were generally regarded as a failure. They combined with the obscurity of his earlier writings a higher degree of prolixity and mysticism. Schelling's later years seem to have been spent in retirement. He died in 1854. No life of him, on any extended scale, has as yet appeared. In his "*Biographia Literaria*" (first published in 1817), Coleridge embodied large extracts from the writings of Schelling, without sufficient acknowledgment, as has sometimes been unkindly alleged. As Schelling is in other works of Coleridge especially referred to by name, the omission here must, in fairness, be attributed rather to forgetfulness or carelessness, than to wilful plagiarism on the part of the English poet and philosopher.

Schelling's writings may be classified as belonging to five periods. To the first period, 1795-96, belong—"On the Possibility of a Form of Philosophy in general;" "*On the Ego as the Principle of Philosophy*," or on the Unconditioned in Human Knowledge;" "*Explanations of the Idealism involved in the Theory of Knowledge*;" "*Letters on Dogmatism and Criticism*." In these he adheres closely to Fichte, who welcomed him as his best expositor. Later in life their relations were less amicable. In the second period (of nature-study, 1797-1801), appeared—"Ideas towards a Philosophy of Nature" (second edition, 1802); "*On the World-Soul*;" "*First Sketch of a System of the Philosophy of Nature*;" "*Journal of Speculative Physics*;" "*System of Transcendental Idealism*." The third period, 1801-3, gave "*Exposition of my System of Philosophy*;" "*Bruno, a Dialogue on the Divine and Natural Principle of Things*;" "*Lectures on the Method of Academical Study*;" "*New Journal of Speculative Physics*." In the fourth period, 1804-5, he published a treatise on "*Philosophy and Religion*;" "*A Statement of the True Relation of the Philosophy of Nature to the Improved Doctrine of Fichte*;" "*On the Relation of the Real and the Ideal*;" "*Philosophical Inquiries concerning the Nature of Human Freedom*;"

"Philosophical Writings," of which only the first volume appeared (1809). In the fifth period (1809 to 1854) Schelling's pen was still busy, as his posthumous works testify; but whether it was that he was discouraged by the reception which his collected writings had met with, or that he had misgivings respecting the validity of his system, or that he was silently labouring to give it greater finish and completeness, his published contributions were very few. After Schelling's death, in 1854, a complete edition of his writings was published by his son in fourteen volumes. The principal works then first published were, "Historico-critical Introduction to the Philosophy of Mythology;" "The Philosophy of Mythology;" "The Philosophy of Revelation." This vast theosophic system fills four large volumes.

In each of the four periods during which Schelling poured forth so many publications, his philosophy assumed a different phasis or aspect. It is not possible, within the limits of this sketch, to give any account of even the simplest of these varying and incomplete manifestations. But the main drift of Schelling's (and of his admirer Coleridge's) philosophy, may be thus briefly summarized:—

It is admitted on all hands, that truth of one kind or another is the proper aim of philosophy. But there are two kinds of truth: truth as it exists *in itself*, and truth as it exists *in relation to us*. The first of these is called technically the *unconditioned*; the latter the *conditioned*. According to Schelling, unconditional truth is the proper object of philosophy. According to his opponents (of whom Sir W. Hamilton may be cited as the most distinguished) conditioned truth is the only proper and possible object of philosophy (see Hamilton's "Discussions," art., "The Philosophy of the Unconditioned.") Such is the precise and primary point at issue between the two schools.

Schelling argues that philosophy is the pursuit of truth as it stands related to pure intellect—i.e. to intellect considered universally, and as not modified in any particular way. He holds that man is competent to the attainment of such truth, and that such truth is absolute and unconditional—not all men, it must be added, but the select few who possess what Schelling calls the "intellectual intuition," which means the "philosophizing sense," and who may rather be said to apprehend truth than to work it out. "Philosophy," says this thinker, "begins where ordinary knowledge ends," and its truths are not provable: they are to be intuitively felt and acknowledged. The other school maintains that philosophy is the pursuit of truth as it stands related to our mind considered as a particular kind of form of intelligence—that man can attain to no other truth than this, and that this truth is relative and conditioned.

The later phases of Schelling's philosophy were chiefly characterized by unavailing attempts to reconcile the pantheistic standpoint which he first assumed, with the notion of a personal deity, and with the fundamental dogmas of the Catholic faith. In doing this he lost the freshness and charm of his first philosophic principles on the one hand, without solving the problem of religion, or satisfying the practical religious requirements of humanity on the other. He merely glided step by step into a strained, unintelligible mysticism, and, without acknowledging it, became a foe to all purely philosophic speculation, and a tacit abettor of an antique romanticism. The influence of Schelling was not confined to Germany. His attempt to unite the process of the physical sciences in one affiliated line with the study of man, both in his individual constitution and historic development, was undoubtedly the germ of the marvellous "Philosophic Positive" of Auguste Comte; and through Coleridge he exerted immense influence on English thought.

In the form of his head and the expression of his countenance Schelling is said to have resembled closely the busts of Socrates, and like him, too, to have been eloquent in conversation.

SCHEL'TOPUSIK or **SHELTOPUSIK** (*Pseudopus pallasi*) is a species of LIZARD, belonging to the family Zonuride. This species is a small snake-like lizard, with no external trace of fore limbs, and the hind limbs reduced to mere scaly appendages. The body is about 2 feet long; there is no distinct neck. In the adult the upper parts of the body are of a chestnut colour, picked off with black, but in the young animal the back is banded with transverse bars of a brown colour on a gray ground. The Scheltopusik is found in Southern Russia, Hungary, Dalmatia, Southern Siberia, and the Mediterranean coasts of Africa. It haunts shady valleys where grass grows abundantly, and feeds on insects, worms, frogs, small lizards, and mice. It is timid and harmless.

SCHEMNITZ (Hun. *Selmecz Banya*), a mining town of North Hungary, on the Schennitz, 2300 feet above the sea, 45 miles N.N.E. of Gran. It has a school of mining, founded in 1760 by Maria Theresa, with 200 students. The mines of Schennitz, partly belonging to the crown, extend under the town, and still yield a considerable revenue, but nothing like their former amount. All the imperial mines are connected with each other, offering in their whole extent a subterranean passage of nearly 3½ miles long. Below the mines is the adit of Joseph II., a magnificent work, 12 feet in height by 10 feet in breadth, extending from Schennitz to the valley of Gran, 10 miles, and so constructed that it may be used either as a canal or railway. The population of Schennitz and its suburbs is 22,000.

SCHER'ZO (Ital., a jest), a name applied in musical composition to a fanciful, wayward movement, full of trick and humour. Musical jests (*scherzi musicali*) are not uncommon in earlier writers, though their point, if they had any, is now quite lost; but when Beethoven took the term as the title of his new variety of movement in the grand orchestral symphony he really gave it its true meaning. The minuet had previously been the light movement of the symphony, and its defined rhythm and cramped dimensions were quite outworn when Beethoven replaced it by the scherzo. Full of grace and originality, and what is more remarkable still, full of humour, and occasionally of rollicking fun, are these unrivalled scherzi of the immortal master, and the more familiar they become the more are they appreciated. The bursts of sunlight which they dash across the gigantic tone-poems they adorn relieve the stress of the mind, fully occupied with listening and striving to absorb the great ideas shadowed forth, refresh the hearer, and at the same time present the most vivid contrast possible to those graver movements whose grandeur they enhance.

Other composers have followed Beethoven's lead, but no one except himself has as yet fully succeeded in the scherzo, except, perhaps, Schubert, who had so much akin with Beethoven. Mendelssohn so fully perceived this that he used any other title that seemed to fit for those movements of his symphonies which take the place of the scherzo, and which are often called scherzi in speaking of them. Thus the scherzo of the Scotch symphony is *vivace non troppo*, &c. Schumann's scherzi are very beautiful, but are works of fancy rather than of gaiety. The term is also in frequent use for small playful occasional pieces for the piano-forte, &c.

SCHIEDAM (pron. *Skeedam'*), in South Holland, 4 miles west of Rotterdam, situated on a broad canal which connects the Schie with the Maas, is a busy manufacturing town, with a population of 22,000. It consists of clean, spacious streets and well-built houses, and has several churches, Latin and other schools, a town-house, a fine exchange, manufactures of linen, brass, and iron castings, vinegar works, roperies, and breweries. It is particularly noted for its distilleries of gin, a liquor which was well known to our ancestors as "scheedam." It contains about

270 distilleries and 75 malt works. Grain is largely imported.

SCHILLER, JOHANN CHRISTOPH FRIEDRICH VON, a distinguished German poet, was born 10th November, 1759, at Marbach, on the Neckar. His father was a Württemberg army surgeon. At fourteen years of age Schiller became a pupil at the military academy of the Duke of Württemberg ("Solitude Castle"), near Stuttgart. In this institution he was first entered as a student of jurisprudence and afterwards of medicine, but the general tenor of the studies and the stern discipline of the place were alike distasteful to the young idealist, who more than once contemplated suicide. What time he could spare was devoted to Homer, Virgil, Shakspeare, and the German poets, especially Klopstock. The popularity of Goethe's "Gotz von Berlichingen," "Clavigo," and "Werther," inspired him with a dramatic impulse, and he wrote "The Student of Nassau," which he subsequently destroyed. After taking his degree he was appointed a physician in the army of Württemberg with a small salary. In 1781 he published "The Robbers" (*Die Räuber*), which was performed at Mannheim in 1782. The intense passion of the piece, its originality and force, produced a widespread sensation. In the same year he issued an "Anthology," in which appeared many of his earlier lyrics and his operetta "Semele." The Duke of Württemberg, however, who was a vulgar tyrant, with none of that sympathy with literature which characterized Goethe's friend, the Duke of Weimar, ordered him to confine himself to his profession, and forbade him to publish anything except on medical subjects. Schiller in desperation fled to Mannheim, where he hoped to devote himself entirely to writing for the stage. But Dalberg, the director of the theatre, gave him little encouragement, and expressed a not very favourable opinion of the poet's new drama, "Fiesco." At this moment Frau von Wolzogen, a lady whose sons had been fellow-students with Schiller at Solitude Castle, generously placed her house at Bamberg, near Münden, at his disposal. Here he spent many happy months. Then he went back to Mannheim in the position of poet to the theatre, and produced "Fiesco" (1783), "Intigue and Love" (*Kabale und Liebe*, 1784), and also published a dramatic and critical journal, the *Thalia* (1785), in which appeared his first really great drama, "Don Carlos." At this time he secured the friendship of Christian Gottfried Körner, the father of the poet Theodor Körner, who possessed considerable means, with which he freely assisted Schiller, and the period of direct struggle and harassing care was passed. In 1785 he removed to Körner's house at Leschwitz, near Leipzig, thence to Dresden, and afterwards to Weimar. At Weimar he wrote his "History of the Revolt in the Netherlands" (*Geschichte des Abfalls der vereinigten Niederlande von der Spanischen Regierung*, 1788), his beautiful poem "The Gods of Greece" (*Die Götter Griechenlands*, 1788), "The Man-Eater" (*Der Menschenfresser*, 1788), and his undramatic romance "The Ghost-seer" (*Geistersucher*, 1789). In 1789, at the instigation of Voigt and Goethe, the Duke of Weimar invited Schiller to occupy the professional chair of history at Jena. This invitation Schiller joyfully accepted, and threw himself with so much ardour into his duties that he seemed to have abandoned poetry entirely. He published lectures, philosophical, historical, and æsthetic, also a "History of the Thirty Years' War" (*Geschichte des Dreissigjährigen Kriegs*, 1792). But at the beginning of 1790 Schiller was married to Charlotte von Lengefeld, and henceforth for him life itself became a poem. "Life is quite a different thing," he wrote, "by the side of a beloved wife, than so forsaken and alone." The union was a perfect one. Hitherto he had been helpless and without self-control, unnerved by every passing female friendship, incapable of concentrated effort worthy of his high genius. Guided and helped by Lotte he was able,

though with broken health and feeble body, to achieve a place in the first rank of the world's literature.

In 1794 he undertook the publication of a new journal, *The Hours* (*Die Horen*), to which Goethe, Humboldt, Fichte, and others contributed. In it he also issued his letters "On the Æsthetic Education of Man." It was in connection with this periodical that he gained the friendship of Goethe, whose superiority to himself he readily recognized, but with whom he had hitherto been but slightly acquainted. The friendship is one of the noblest incidents in modern literary history. In spite of the efforts of Kotzebue, the brothers Schlegel, and others to disturb it, it lasted without interruption for the remaining eleven years of Schiller's life. "I think I may say," wrote Schiller, "that during the years I have lived with him, I have not for one moment doubted his character. There is in Goethe a high sincerity, a sterlingness of nature, and the loftiest zeal for the right and good." The severe criticism which greeted the *Horen*, caused Goethe and Schiller to avenge themselves on the critics by the joint publication of epigrams "Xenien" (1797), which appeared in the *Musenalmunach*, another journal under Schiller's editorship, in which also appeared the powerful ballads "Der Ring des Polykrates" (1797), "Die Kraniche des Ibykus" (The Cranes of Ibycus, 1797), "Der Taucher" (The Diver, 1797), "Die Burgschaft" (The Hostage, 1798), and "Der Kampf mit dem Drachen" (The Fight with the Dragon, 1798). In 1799 he completed his greatest poem, "Das Lied von der Glocke" (The Song of the Bell) and his greatest drama, "Wallenstein." In this year he removed with his family from Jena to Weimar.

After translating Shakspeare's "Macbeth" (1801) Schiller wrote his "Mary Stuart" (1801), following this with "Die Jungfrau von Orléans" (The Maid of Orléans, 1801), an endeavour to defend her character against the satire of Voltaire in "La Pucelle." "Die Braut von Messina" (The Bride of Messina) was written in 1803, "Die Huldigung der Künste" (The Homage to the Arts) in 1804, in which year was also published his last great drama "Wilhelm Tell." Schiller translated from the French the "Phædre" of Racine, from the Italian a tragi-comedy by Gozzi, "Turandot," and from the Greek the "Iphigenia in Aulis" of Euripides, and part of the "Phæmæians" of the same poet. Of works unfinished at his death we have "Demetrius," "Warbeck," and "The Children of the House."

The opening of 1805 found Goethe on a bed of sickness and Schiller in exceptionally good health for one always so delicate. Goethe had a presentiment that either he or Schiller would die during the year. Schiller caught a fever and died on the 9th of May, at the early age of forty-five. Goethe, ten years his senior, was to live yet another twenty-seven years. "That Schiller went away early," wrote his great friend, "is for us also a gain. From his tomb there comes to us an impulse, strengthening us, as with the breath of his own might, and awakening a most earnest longing to fulfil lovingly, and more and more, the work that he began. So, in all that he wished to do, and in all that he fulfilled, he shall live on for ever, for his own nation and for mankind."

"Wallenstein" is a powerful drama, or rather three dramas of somewhat unequal power. "Wallenstein's Lager" shows us with matchless skill the camp of the great general, with all the discordant elements he had welded into an army. "Die Piccolomini," the second part of the trilogy, shows us Wallenstein surrounded by dangers and with but one faithful heart anxious for his safety, Max Piccolomini, the brave young lover of his daughter Thékla. Thékla's song, with its thrilling lines—

"Ich habe genossen das irdische Glück,
Ich habe gelebt und geliebet"
("I have enjoyed earth's highest joy,
I have lived and loved")

has now a place in all literatures. The third part of the drama, "Wallenstein's Tod," deals with the death of the hero, who is murdered whilst boundlessly confident of his power to oppose successfully all adverse circumstances. Schiller's dramatic theories are here the opposite of Shakespeare's. Boundless confidence in one of Shakespeare's men when combined with greatness must inevitably succeed; moreover presentiment of coming ill is an invariable feature in the plays of the English dramatist. The Wallenstein of Schiller is great and confident, but he fails, and he has no presentiment of failure. "Wilhelm Tell" is a great drama, full of magnificent prophecies of freedom, which kindled an enthusiasm that proved of infinite service to Germany in the war of liberation which was soon to come to her.

It is by his poems and ballads, by his "Wallenstein" and "Wilhelm Tell" that Schiller must be judged when his place in literature is assigned to him; it is these which entitle him to rank side by side with Goethe as one of the two greatest poets of Germany; but in all that he has written, both in prose and poetry, there breathes a purity and nobleness, a depth of aspiration and of striving, which have well entitled him to the place of Germany's best beloved bard. Less myriad-minded than Goethe, less nobly self-sustained than Lessing, he yet endears us by his very weaknesses, and merits the position of boundless hero-worship which, in common with Luther, his countrymen have unanimously allotted to him. He rests by the side of Goethe in the Princes' Vault at Weimar.

There are innumerable cheap editions of Schiller's works, but perhaps the most satisfactory is the one in Cotta's World Library, in fifteen volumes, published at Stuttgart. The correspondence between Schiller and Goethe, "Briefwechsel zwischen Schiller und Goethe," published in the "Collection Spemann," is also a marvel of cheapness. Many lives of Schiller have been published, the best of which are by Hoffmeister, Schwab, Schafer, Pallaske, Düntzer, and Karoline von Wolzogen, the poet's sister-in-law, who married a son of his early friend. Carlyle's "Life of Schiller" (1825) is interesting in itself and still more because of the friendship which it furthered between the eminent Scotchman and Goethe, who wrote a preface to a German translation. But Carlyle had not at his command the voluminous correspondence of Schiller with Herder, Schlegel, Cotta, Goethe, Wilhelm von Humboldt, Fichte, Wieland, and Schiller's sister (Christophine). It is this correspondence which gives peculiar interest to the biographies of Pallaske and Düntzer. Several translations of "Wallenstein" have appeared; the first, by Coleridge, in the opinion of Professor Henry Morley, surpasses the original. The late Lord Lytton translated the ballads and poems, and a complete translation of Schiller's works, in six volumes, may be found in Bohn's Library. Adolph Stahl's "Jena and Weimar" is invaluable.

SCHILLING, the German form of our word *Shilling*, and derived, like it, from the root $\sqrt{\text{SKIL}}$, to divide, with the addition of the diminutive affix *-ling*, so that the word means "small division," applied, of course, to the pound as the standard.

The principal coins bearing the name of schilling are the Hamburg silver schilling, worth 5-6ths of an English penny; the Mecklenburg schilling, worth a minute fraction less than three farthings; and the schilling of the Cape of Good Hope, containing six stivers, and worth 2½d. English. The old schilling of the Hanse Towns, now obsolete, was a billion (base) coin, and was about equal to our penny in value.

SCHINKEL, KARL FRIEDRICH, the head of the Greek revival in architecture in Germany, was born 13th March, 1781, at Neu-Ruppin, in Brandenburg. Schinkel, when only nineteen, had shown so much talent that he had been instructed by Gilly, his master, to super-

intend the execution of some of his buildings; and after his death in 1800 he continued the engagements, pursuing at the same time his theoretical and artistic studies, and making designs of ornamental articles for modellers, metal-workers, and artisans of that class, in order to provide a fund to enable him to visit Italy. In 1803 he set out for Italy, returning to Berlin in the spring of 1805. The state of affairs there offered little encouragement to architecture, and he turned for a time to landscape-printing. But from the year 1815 he was incessantly and actively engaged as an architect. Among his earliest buildings were the Hauptwache, Theatre, and Museum, at Berlin. He also erected the Werder Kirche (Gothic), Bauschule, and Observatory, at Berlin; the theatre at Hamburg; Schloss Krzesowice, Charlotten Hof, and the Nicolai Kirche, at Potsdam. He died 9th October, 1841. Schinkel was undoubtedly a man of powerful and original genius, who was one of the first architects to grasp the new ideas of the time, and embody them in Greek forms—not crudely initiated, but thought out independently, and with a vital character entirely his own. All his productions are remarkable for unity of design, and harmony and unity of detail.

SCHINUS (Gr. *schinos*, the mastic tree), a genus of the order ANACARDIACEÆ, distinguished by its unequally pinnate leaves, which in some species are so swollen with a resinous fluid that the least amount of unusual repletion of the tissue causes it to be discharged. The trees and shrubs of this genus belong to tropical America. *Schinus Molle* yields a resin which is found useful as an astringent for the gums, and its root is also employed medicinally. The fresh juice of the variety *Atropa* is used in Brazil as a dark brown varnish for covering new cordage, and also as an external application in ophthalmic disease. If the leaves of this and other species are thrown into water, they start and leap about as if alive, owing to the strong recoil of the tissue, and they also cast out jets of their peculiar fluid.

SCHIPKA PASS, a pass of the Balkan Mountains, between Bulgaria and Roumelia. It is celebrated for the tremendous struggle of which it was the scene during the Russo-Turkish War of 1877-78: the Turkish general, Suleiman Pasha, again and again attacking the Russian positions, with the loss of thousands of lives, but without preventing the ultimate advance of the Russians. It was generally believed at the time that Suleiman was inspired by personal ambition, and that it was jealousy of Osman Pasha rather than a sincere desire to beat the enemy that led him to waste his strength in fruitless attacks upon the redoubts of the Schipka. These suspicions led to his falling into disfavour after the close of the war, and he died in exile at Bagdad in April, 1883.

SCHISMA, in music, a very minute musical interval (32768 : 32805). See *SCHISMATA*.

SCHIST (Gr. *schisma*, a splitting), in geology, a term applied to more or less crystalline fissile rocks, which do not cleave in regular thin slabs, but are readily split up into small leaf-like scales. Such deposits fall under the denomination of metamorphic rocks; and they may be either the first-formed sedimentary strata of the earth's crust, or these rearranged, or merely ordinary beds of shale and sandstone altered by heat and heated water. Their peculiar flaky structure leads to their being technically referred to as foliated (Lat. *folium*, a leaf), in contradistinction to the regularly bedded character of *SANDSTONE*, which is a truly laminated formation, *i.e.* splits into continuous even slabs. The most common forms of this rock are mica-schist (consisting of alternating flakes of mica and quartz), talc-schist (talc and quartz), chlorite-schist (mostly chlorite), and hornblende-schist (hornblende and quartz). *GNEISS* is also a schistose rock, but has a third essential constituent, being practically a foliated granite.

SCHLANGENBAD, in Germany, on the northern confine of the fertile Rheingau district, so celebrated for its cornfields and vineyards, is a small village about 6 miles west of Wiesbaden. Its situation is eminently picturesque, for finely wooded hills inclose it in a tranquil valley, opening up at intervals some extensive views of the undulating country beyond. But it is frequented by tourists chiefly for the sake of its mineral baths, which are beneficial in cases of nervous irritability, and exercise a good effect on the skin. The chief ingredients of the waters are impure lime, carbonate of lime, carbonate and sulphate of soda, and carbonate of magnesia. The temperature averages 80 F. in.

SCHLEGEL, AUGUST WILHELM VON, a German scholar, born in Hanover, 5th September, 1767, died in Bonn, 12th May, 1845. He was a son of the poet and clergyman Johann Adolf Schlegel, and studied at Göttingen at first theology and afterward philology under Heyne. He had successfully cultivated poetry from his earliest boyhood, which led to his friendship with Körner, and he is said to have been the first to compose German sonnets. After three years' residence at Amsterdam as private tutor, he settled in Jena, where he became professor, and joined his brother Friedrich in writing essays which opened the era of the romantic school of literature. Having separated from his wife, a daughter of Michaels, in 1802 he removed to Berlin, where he lectured on literature and the fine arts. In 1805 he accompanied Mme. de Staël on her travels. In 1808 he delivered at Vienna his celebrated lectures on dramatic art, which reveal his immense admiration for Shakspeare. They were published in three vols. (Hofberg, 1809-11), and several times translated into English. Visiting Stockholm in 1812, he became secretary to Bernadotte, the future king of Sweden. In 1815, after the second occupation of Paris by the allies, he joined Mme. de Staël, and remained with her till her death in 1817. From 1819 to the end of his life he was professor of history at Bonn. His second marriage, in 1819, with a daughter of Paulus of Heidelberg, resulted like the first, in a separation. His literary activity began at Jena, where he wrote for Schiller's *Horen* and other periodicals, edited in conjunction with his brother Friedrich the *Athenäum*, and began his translation of the plays of Shakspeare, of which he rendered seventeen, the rest being prepared by Dorothea Tieck, under the supervision of her father, and by Count Bunsen. In 1801 he published with his brother "Charakteristiken und Kritiken" (two vols.), which was followed by his translations of Calderon's five principal plays ("Spanisches Theater," two vols., 1803-09) and of Spanish, Italian, and Portuguese poetry ("Bibliothek der italienischen spanischen, und portugiesischen Poesie," 1804). At the suggestion of Mme. de Staël he published in French in 1807 "Comparaison de la Poésie d'Europe avec celle de Rome," which attracted much attention and aroused much indignation in France. In his "Poetische Werke" (two vols., 1811) are contained his best poems, and in his "Kritische Schriften" (two vols., 1828) one of his most profound æsthetical disquisitions. He was also remarkable as an Oriental scholar, and as the first in Germany to master Sanskrit. His writings are comprised in his "Sammtliche Werke" (twelve vols., 1816-47), "Oeuvres complètes en français" (three vols., 1846), and "Opuscula Latina" (1848), the last including his translation of the "Ramayana" and other contributions to Sanskrit literature.

SCHLEGEL, FRIEDRICH KARL WILHELM VON, a German author, brother of the preceding, born in Hanover, 10th March, 1772, died in Dresden, 12th January, 1829. He went to Leipzig to qualify himself for commerce, but soon entered the University of Göttingen, and completed his studies at Leipzig. In 1800 he established himself as a *privat-docent* of philosophy at Jena, and subsequently

lectured also in Paris. Having with his wife, a daughter of Moses Mendelssohn, joined the Catholic Church, he went in 1808 to Vienna, and in the following year accompanied the Archduke Charles on the battlefield as a secretary, issuing patriotic proclamations against Napoleon. Subsequently he was secretary of the Austrian embassy at Frankfurt till 1818, when he returned to Vienna and resumed his lectures there, and in 1828-29 lectured in Dresden. He shared with his brother and Tieck in the leadership of the romantic school, and was especially remarkable as a critic and thinker of great originality. His principal works are: "Griechen und Römer" (1797); "Geschichte der Poesie der Griechen und Römer" (1798); "Lucinde" (1799), a novel of which only one volume was published, on account of its voluptuous character; "Alarkos," a tragedy (1802); "Ueber die Sprache und Weisheit der Indier" (1808); "Vorlesungen über die neuere Geschichte" (1811); "Geschichte der alten und neuen Literatur" (two vols., 1815); "Philosophie der Geschichte" (two vols., 1829); and "Philosophie der Sprache" (1830). His works were collected in fifteen vols. (1822-46). He also published several works written by his wife. His "Lectures on Modern History," "Philosophy of History," "Philosophy of Life and Philosophy of Language," and other works, have been translated into English.

SCHLEIERMACHER, FRIEDRICH DANIEL ERNST, the most influential theologian of Protestant Germany that has appeared during the present century, was born in Breslau, on the 21st of November, 1768. His father was a military chaplain of the Reformed Church. In 1785 he went to the Gymnasium or College of Barby, with the view of being educated in theological learning for the ministry of the United Moravian Brethren. But here he soon became dissatisfied both with the scientific qualifications of his instructors, and with the doctrines of the Moravian confession; and, after a painful but most honourable conflict between himself and his father, the design was abandoned. Being still anxious to pursue the study of theology, he removed to the University of Halle, where he devoted much of his time to the study of philosophy in the writings of Wolf, Kant, and Jacobi. He was one of the poorest, as well as ablest students of Halle. When his course of study was completed, his wardrobe was in such a condition that he could not present himself before the board of examination in Berlin till he got his empty purse replenished from home. In 1790 he was ordained, and from 1790 till 1793 he was a private tutor. Then he was for a short time a teacher in two of the schools at Berlin, and in 1794 and 1795 he acted as assistant preacher at Landsberg on the Warthe. In 1796 he was appointed preacher to the great hospital in Berlin called the Charity; and it was while occupying this position that he gave to the world his first important work, the "Reden über die Religion" (Discourses on Religion), which appeared in 1799, and immediately drew upon him the eyes of the highly educated portion of the community, to whom it was specially addressed. Designed to demonstrate by arguments of reason the necessity of religion for man, it was rather a treatise on the philosophy of religion than a theological work. He left Berlin in 1802, and removed to Stolpe in the capacity of a royal chaplain, and this change of residence was of as great advantage to his subsequent moral and spiritual development, as his removal from Barby had been to his intellectual life. At Stolpe he remained for two years, during which he finished and brought out his elaborate "Kritik aller bisherigen Sittenlehre" (Critique of all past systems of Morals), the first of his works which had a strictly philosophical form; besides continuing to work hard upon a translation of Plato, which was to have been the joint production of Schlegel and himself, but which in the end, owing to his friend's hopeless habits of procrastination, fell entirely into his

own hands. In 1804 he was invited to occupy a theological chair at Würzburg, and had resolved to accept it; but the King of Prussia withheld his permission, and bestowed on him instead a chair at Halle, to which he removed in the same year. He was appointed university preacher at the same time, and both his lectures and his sermons immediately excited in the students the warmest interest and enthusiasm.

In 1807 the lectures of the university were interrupted and finally suspended by the French invasion, and Schleiermacher suffered not a little personal hardship at the hands of the enemy. His purse was again almost empty, and his health suffered from the spare diet rendered necessary by the high price of provisions. In 1810 the University of Berlin was opened, and Schleiermacher was placed by the king at the head of one of the most brilliant theological faculties that Germany had ever produced, including Neander, De Wette, and Marheineke; and associated with such men in the other faculties as Fichte, Buttman, Böckh, and Lachmann. It is generally admitted that the commanding position which Berlin assumed from the very first among the German seats of learning, was very much due to the genius of Schleiermacher as an original thinker in his two capacities of university preacher and theological professor. The "Darstellung des Christlichen Glaubens nach den Grundsätzen der Evangelischen Kirche" (Exhibition of the Christian Faith according to the principles of the Evangelical Church), the first edition of which appeared in 1821-22, and the second in 1830-31, was the author's chief work, and his most important legacy to posterity. He survived till the 12th of February, 1834, when he was carried off after a short illness by inflammation of the lungs. The chief use of Schleiermacher's teaching has been to serve the purpose of a viaduct across the gulf which had opened to many educated minds in Germany between science and Christian faith.

SCHLESWIG-HOLSTEIN, two duchies which, until 1864, formed the southernmost portion of the kingdom of Denmark, but which now form a province of Prussia. The area is 8,524 square miles, and the population in 1880 was 1,127,119.

SCHLESWIG, sometimes called South Jutland, is bounded N. by Jutland, E. by the Little Belt, S. by Holstein, from which it is divided by the river Eider and the Kiel Canal, and W. by the German Ocean. The length, north to south, is about 70 miles, and the breadth, east to west, varies from 30 to 56 miles, not including the islands on the east and west coasts.

Schleswig is in general a level country. A range of low hills enters it from Holstein, and, traversing it from south to north, passes into Jutland. On the west coast there are low and rich marsh-lands, which are protected by dykes, 20 feet high, against the spring tides, which often rise to the height of 13 feet. The country so protected affords pasturage for large herds of very superior cattle, as well as great numbers of fine horses. As the sea in many places deposits alluvium new dykes are erected from time to time to secure these additions. The principal rivers are the Eider, the Widau, and the Aue. The east coast is not so low as the west, but it is equally fertile. In the interior the soil is sandy, interspersed with heaths, and not very productive. Large numbers of sheep are kept, and quantities of valuable wool obtained from them. The climate is on the whole temperate and healthy, but damper and less salubrious on the west than on the east coast. The country produces corn, pulse, flax, hemp, rape-seed, hay, clover, garden vegetables, and potatoes. Wood is scarce, both for building and fuel, but this is in a great measure compensated by the abundance of turf. The country contains limestone, chalk, and slate, but no metallic minerals. The chief occupations of the inhabitants are agriculture, the breeding of cattle, and the

fisheries. The exports consist mostly of horses, oxen, and dairy produce. The inhabitants, who profess the Protestant religion, are partly of German, partly of Danish or Frisian descent. About half of them speak the Danish language. They reside chiefly in the northern part of the country: the southern portion, owing to its proximity to Holstein, has gradually become more German than Danish in the tastes and characteristics of the inhabitants. The most important islands on the coast are Arroe, Loh, and Femern.

HOLSTEIN is bounded N. by Schleswig, E. by the Baltic, W. by the German Ocean, S.E. by Lübeck and Lauenburg, S. by the Elbe (which separates it from Hanover) and the territory of Hamburg. The inhabitants are mostly German in language as well as in predilections, and Lutherans in religion. The surface and soil are considerably diversified; the east part is somewhat hilly, and, besides fertile plains, has woods, lakes, and picturesque scenery; the middle is comparatively barren, and is in many parts covered with heath; the west district, along the Elbe and the German Ocean consists principally of flat, low-lying, and rich marsh-land, secured by dykes and sluices against the overflowing of the sea. Agriculture is successfully carried on, and the country being in many parts inclosed by hedges, is little inferior in appearance to the best districts of England.

The principal rivers are the Elbe, the Stor, the Lohr, the Alster, the Bille, the Schwentine, and the Trave. The largest of the lakes is that of Plön. The mineral products are salt, lime, and plaster of Paris, in the vicinity of Oldesloe, and amber near the Baltic, but there are no metals. The surface is in many parts strewed with boulder stones. The agricultural products are corn, pulse, potatoes, and some hops, flax, and hemp. The breed of horses and of horned cattle is excellent. There are likewise sheep, swine, and abundance of poultry and game. There are no manufactures that need any particular notice. The exports consist of corn, timber, horses, cattle, cheese, and butter; the imports, of colonial produce, wines, and manufactures. The herring fishery and the Greenland whale and seal fishery are a source of considerable profit. Trade is greatly facilitated by the Holstein or Kiel Canal, made in the years 1777-81, at an expense of above 2,500,000 dollars to form a communication between the German Ocean and the Baltic.

The political struggles in Schleswig and Holstein in 1818 and 1864 arose chiefly out of disagreements concerning the succession to the sovereign power. Frederick I., duke of Schleswig and Holstein, became King of Denmark in 1523. In 1533 the duchies were united in perpetuity to the Danish crown. Shortly afterwards a partition of the greater part of them was made by Christian III. between his brothers; this gave rise to innumerable quarrels and struggles, which were not terminated until 1773, when the alienated territory was recovered, and other districts given in exchange for them. The King of Denmark, as Duke of Holstein, was a member of the late Germanic Confederation; and it was on that ground that many German states interfered in respect to the politics of the duchies. After the death of Frederick VI. in 1839 a contest arose respecting the succession, as the law of primogeniture was different in Schleswig-Holstein from that which had been established in Denmark. Disagreements gradually arose between the latter country and Germany; and in 1846 Christian VIII. made a formal claim of sovereignty over the duchies, which Schleswig resisted, and appealed to Germany for support. In February, 1848, the people were invited to send deputies to the Danish Parliament; but they claimed a separate assembly of their own. In April a provisional government was assembled at Rendsburg; Schleswig voted herself a member of the Germanic Confederation, and the King of Prussia was invited to take part with the duchies. The king consented, and the German Diet sent troops to assist

the inhabitants in their resistance to the King of Denmark. Various indecisive engagements took place, but ultimately the German troops were withdrawn and the duchies left to themselves, the King of Denmark agreeing to give them a new constitution—subject to the approval of the Germanic Confederation. All the old treaties with respect to the authority of Denmark were to be maintained; and as the inhabitants still continued their opposition to that power, in 1851 Austria sent an army to support the King of Denmark, and to assist him in dissolving the joint Schleswig-Holstein assembly. On the accession of the present King of Denmark to the throne in 1863 Prince Frederick of Augustenburg called on the people of the duchies to renounce their allegiance and accept him as their lawful ruler, grounding his claims on the fact of his being a descendant from an older branch of the line of the house from which the dukes of Holstein had descended, although his father and uncle, after the disturbances in 1818, had accepted a money compensation, and renounced all claims to any portion of Danish territory, both for themselves and their successors. The pretensions of the prince were, however, acknowledged by a portion of the Holstein Diet, who, on behalf of themselves, and also of the adjoining duchy of Schleswig, petitioned the German Diet to support them. Without exactly guaranteeing to do this the Diet sent troops into Holstein only in 1864, and the dual authority was established at Kiel. The Danish government refused to recognize this, or to withdraw the constitution under which the duchies were governed as a part of that kingdom, without, at all events, convening the Rigsraad, by whose sanction alone any constitutional change could be made. For this the Austrians and Prussians declined to wait, and hostilities were commenced. During several weeks the Danes held out very bravely, but were at last compelled to submit to the superior numbers and efficiency of their opponents, and accept the hard terms dictated by them—viz. that Denmark should renounce all right to the duchies of Schleswig-Holstein and Lauenburg in favour of Austria and Prussia, and recognize the arrangements made in respect to them by those powers. It was naturally presumed that they would place Prince Augustenburg on the throne, especially as he was undoubtedly very popular in Holstein; but after keeping the matter in suspense month after month, Austria and Prussia came to the conclusion that he was not in reality the rightful claimant, but that the undoubted ruler was the King of Denmark, from whom, however, they considered the duchies had passed to themselves by right of conquest. This extraordinary and self-condemnatory solution was ratified by the treaty of Gastein in August, 1865, by which Holstein was placed under the protection of Austria and Schleswig under that of Prussia. The right he was supposed to possess in Lauenburg was sold by Austria to Prussia for 2,500,000 dollars. It was evident that this compact could not long exist, and accordingly early in the following year, Prussia took advantage of some defects in the administration of Holstein (chiefly allowing the Holstein press to advocate the claims of the Prince of Augustenburg), which she said were dictated by an unfriendly feeling towards her, to break off the alliance with Austria. The relations between the two powers rapidly assumed a more threatening character, and ultimately led to the Seven Weeks' War, one of the results of which was that both Schleswig and Holstein came into the possession of Prussia, and now form an integral portion of that kingdom. By the treaty of Prague, however, concluded in 1866, Prussia undertook to restore the district known as North Schleswig to the Danish crown, and in 1868 negotiations were commenced with that view; the difficulties, however, raised by Prussia prevented any agreement being arrived at, and all Schleswig still remains subject to Prussian taxation and conscription.

SCHLESWIG, the capital of the above province, is situ-

ated in a pleasant country at the mouth of the river Sley, which forms a small shallow bay obstructed by sandbanks. It is a long irregularly built place. The houses are mostly of brick, and resemble in neatness those of a Dutch town. The principal public buildings are the cathedral and other churches—one on the site of a heathen temple—the government offices, the town-house, the orphan asylum, the poor-house, and the nunnery of St. John. The cathedral has a very unprepossessing exterior, but contains many beautiful objects within, among others an altar-piece by a pupil of Albert Dürer, said to be one of the richest specimens of carvings in existence. Near the town is the Castle of Gottorp, formerly the residence of the dukes of Holstein-Gottorp, but now used as a barracks. The population of the city was 15,446 in 1880. There are manufactures of china, earthenware, lace, cambrics, thread, leather, sail-cloth, woollens, starch, and refined sugar; but the town is not in a prosperous condition, in consequence of the small depth of water in the harbour. Schleswig was formerly a member of the Hanseatic League. It was taken by the allied Prussian and Austrian army in 1864.

SCHMALKALDIC LEAGUE is the name given to the famous alliance of Protestant states for nine years, agreed to at Schmalkalden, in Hesse-Cassel, 27th February, 1531, by nine Protestant independent rulers and eleven free imperial cities. The League was afterwards joined by five more princes and ten more cities. The object of the League was the defence of the reformed faith against the full strength of the Roman Catholic world, headed by the Pope and the Emperor (Charles V.). The Protestant leaders, elected by the League, were the Elector of Saxony and the Landgrave of Hesse. The main territorial extent of the Protestant faith was then much the same as now, covering all North Germany (including Denmark), Saxony, Wurtemberg, and part of Bavaria and Switzerland. In 1535 the League first raised its permanent army of 10,000 foot and 2000 horse, and extended the terms of union; further defining their mutual agreement, also, by signing the *Articles of Schmalkalden*, drawn up by Luther, in February, 1537. It was found necessary to advance against the armies of the "Holy League" (the Roman Catholic alliance), and the Protestant forces reached the Danube. Unhappily dissensions prevented anything definite coming from this expedition though successful in itself, and advantage was taken of this want of harmony by the astute emperor. In 1546 Charles declared the Elector of Saxony and the Landgrave of Hesse outlaws, and Maurice, duke of Saxony, occupied the electorate for the imperialists. This danger brought back the army of the League from the Danube, and the intruder was, after some sharp fighting, ejected. The main armies met in the following year at Muhlberg, on 24th April, 1547, and the day went against the League, both its leaders being taken prisoners. The cause of Protestantism was, however, not lost, though nearly all the defeated princes and towns nominally accepted Charles' scheme of "the Interim," a religious compromise granting certain liberties to the Lutherans in consideration of their remaining affiliated to the church. But Duke Maurice succeeded to the electorate of Saxony, and unexpectedly changed sides. Catching Charles at a critical moment, when he was totally unprepared, he suddenly declared war; and the emperor had actually to fly for his life to Carinthia. He was glad enough to agree to the treaty of Passau, 31st July, 1552, by which the whole disaster of the Schmalkaldic war was repaired, the Protestants were granted full liberty of faith, and the celebrated Diet of Augsburg (which met in 1555 to settle a religious peace) was agreed to and prepared for.

SCHMIDELIA, a genus of plants belonging to the order SAPINDACEÆ. *Schmidelia serrata* has a small red succulent fruit, which is eaten by the natives of Hindustan. The root is astringent, and is employed by the native

practitioners in diarrhoea. *Schmidelia Cochinchinensis* is native of Cochin-China, on the banks of rivers. The leaves are used as cataplasms in contusions. *Schmidelia Africana* is employed in Abyssinia as a remedy for tapeworm.

SCHNORR VON KARLSFELD, JULIUS, a celebrated modern artist, was born at Leipzig in 1794. At seventeen he entered the Academy of Vienna, and subsequently joined the new school of German Pre-Raphaelites. In 1825 he settled at Munich, and became a kind of poet-painter to the Bavarian Court. With a staff of trained assistants he clothed the five halls of the new palace with frescoes illustrative of the *NIBELUNGEN-LIED*. Other apartments he decorated with scenes from the histories of Charlemagne, Frederick Barbarossa, and Rudolph of Hapsburg. His next great work was a series of "Bible Pictures," or Scripture history, in 180 designs, which became very popular throughout Christendom. He afterwards gave his attention to designs for church windows, and obtained commissions not only in Germany but in other countries. The very fine series of windows in the Glasgow Cathedral were executed from his drawings in the Royal Factory at Munich. He died at Munich in 1872.

SCHOLASTIC PHILOSOPHY. See the article *NOMINALISTS AND REALISTS*, and the section *Schoolmen* in the article *PHILOSOPHY*.

SCHOMBERG, ARMAND FREDERIC DE, was born in or about 1619. Bred a soldier, he began his career in the Swedish army during the Thirty Years' War. He next entered the service of the Netherlands, and afterwards that of France, in which from 1650 to 1685 he led an active and distinguished life, and rose to the rank of marshal. In 1685 the revocation of the Edict of Nantes drove him to seek liberty of conscience in another country; and he betook himself first to the service of Portugal, then to that of the Elector of Brandenburg, and lastly to that of the Prince of Orange, when about to make his descent upon England in 1688. Schomberg was sent to Ireland in 1689 as commander-in-chief; where, during ten months, with a wretched, ill-disciplined force, lacking every necessary of war, he contrived to keep King James at bay until William III. was able to cross to Ireland in person. He was killed, 1st July, 1690, at the battle of the Boyne, and a perpetual pension was bestowed by the king upon his heirs.

SCHONBRUNN, the imperial palace of the Austrian house, pleasantly situated in the immediate neighbourhood of Vienna, and famous for its architectural pretensions and the beautiful gardens which surround it. The Emperor Napoleon resided in it in 1809, after the battle of Austerlitz.

SCHONBURG is a part of Saxony, consisting of the possessions of the ancient house of Schönburg. The country is mountainous, but very fertile, producing corn, timber, flax, fruit, potter's clay, cinnabar, and slate. The inhabitants are very industrious, and, besides their agricultural occupations, have considerable manufactures of linen, woollen, cotton, paper, and earthenware.

SCHOOLMEN. See the section *Schoolmen* in the article *PHILOSOPHY*. The principal philosophers therein referred to are all treated, as to their biography, in separate articles. [See *ALBERTUS MAGNUS*, *ANSERM*, *AQUINAS*, *DUNS SCOTUS*, *OCCAM*, *ROSCELLINUS*, &c.] In many cases the main points of their teaching are also given.

SCHOOLS. See *EDUCATION*.

SCHOOLS OF DESIGN AND SCHOOLS OF ART. See *DESIGN*, *SCHOOLS OF*.

SCHOONER. A small fore-and-aft-rigged vessel, with two masts, fore and main, or three masts, fore, main, and mizzen. The bowsprit is either a running bowsprit in one piece, or a small standing bowsprit with a jib-boom. See *SAILS AND RIGGING*.

SCHOPENHAUER, ARTHUR, the apostle of *PESSIMISM*, a distinguished German philosopher, was the only son of Johanne Schopenhauer, a distinguished authoress of her time, whose novels and books of travel were widely read. His father, H. F. Schopenhauer, was a banker. He was born at Dantzig, 22nd February, 1788, and while a boy accompanied his parents on their travels through France and England. In 1809 he was entered at the University of Göttingen, where from the study of natural history he passed to that of philosophy. From Göttingen he proceeded to Berlin, where he heard Fichte; then took his degree as Ph.D. at Jena, and passed a winter at Weimar, where he was honoured with the acquaintance of Goethe. During the year 1818 he wrote at Dresden his opus magnum, "*Die Welt als Wille und Vorstellung*," which appeared in 1819; second edition, greatly enlarged, in 1844. After his return from a journey to Rome and Naples he began lecturing at Berlin, but soon desisted, and at length settled in 1830 at Frankfurt-on-the-Main, where he lived till his death on 21st September, 1860, in complete literary retirement. For thirty years "*The World as Will and Idea*" lay absolutely unnoticed until in 1851 attention was called to it by the publication of Schopenhauer's "*Parerga and Paralipomena*," or as one might say, "*Notes and Additions*." The excellent, polished style, clear, interesting, and devoid of all political jargon, attracted notice, and men began to read the great work itself. Since then pessimism has been a power in the world of thought.

A curious life was that of Schopenhauer from 1830 to 1860. He seems to have endeavoured to decline every duty of life. He amused himself at the theatre and the picture galleries, walked, read, dined, and played the flute. He professed himself a great admirer of female charms, and had some small reputation as a "lady-killer;" he was fond of the table, and to his regret had to be abstemious as to wine, too much of which upset him. In argument he was completely overbearing, in politics strongly reactionary. The people in general he despised as "a collection of brutes," and their clamour for more liberty (in 1848) as "twaddle." He left his fortune to those who sternly put down the popular movements. As for people in particular, he neglected altogether his charming and clever mother, and was so devoid of common humanity as to cripple his landlady for life by kicking her downstairs, for which he was condemned by the law to pension her during her life. In many places of his writings he cynically avows that he constantly endeavoured to get a view of the despicability of mankind; and most people would fairly admit, after what has been said above, that he supplied in his own person a strong argument in favour of his doctrine. The only things his biographers can find to relieve this dreary waste of brutal selfishness are his love for his spaniel and occasional doles to his poor relations. Not that he inconvenienced himself on their account, for at his death he was found by judicious stock-exchange investments to have doubled his fortune.

There is an Oriental fable, dear to Thomas Carlyle, which relates that a man once stood on his head in a marketplace in Asia, and complained that the world was upside down—and so (for him at least) it remained till some one picked him up and put him on his legs. To a sensual voluptuary life may be worthless; his fellow-creatures brutes, fit only to be kicked downstairs or driven into order along the streets by bayonet charges; women but toys of pleasure and foes of our reason, only worthy of a sane man's contempt and satire; children needless troubles; God "a tradition of the nursery," as he says. There was no one who could turn the poor bighted soul on his legs, and the world remained a mockery and a lie to him all these long forty years after his horrible discovery; although this did not, as has been seen, in the least prevent

him from snatching whatever he could in the way of pleasure.

The one reality in all this miserable phantasmagoria of the upside-down philosopher was Will. "There is *nothing*," said he, "but will and facts." Free-will he laughed at: a man's character he declared unalterable by himself, since it is rigidly subject to its environment, according to the law of cause and effect. Conscience he analyses; and its five elements are—(1) fear of man, (2) superstition, (3) prejudice, (4) vanity, (5) custom. Virtue he considers identical with self-love; to show kindness to any man is simply to show kindness to that which we ate; "tears," he says in one place, "spring from self-pity."

But worse than this:—This Will is not rational, it is altogether blind; it is a mere instinct, and has no plan or purpose: a man is the sport of this dark mysterious power. Existence is therefore an evil. "Life," he says consistently, "so far from being a state of enjoyment, is always, and necessarily, one of suffering, and the deepest cause of this suffering lies in the will itself." Elsewhere he says, "Life is a struggle for existence, with the certainty of being vanquished." Increased intelligence is merely increased capacity for pain: the man of genius is but so much more miserable than the fool. To live is to will, to will is to strive, to strive is to suffer, that is the chain of pessimism, only broken for brief instants when we lose ourselves in the pleasures of art. Pleasure is thus seen to be merely negative, and that is always Schopenhauer's view of it. Finally, it has been stated in the article PESSIMISM, he arrives at the "admirable" conclusion that this is the worst (*pessimum*) of all possible worlds; if it were only one minute shade worse than it is we should refuse to live. Man's highest aim should be to educate the species to the ideal point of refusing to will, when the whole miserable world will die out like the snuff of a candle.

Schopenhauer's life may be studied in the pages of "Gwinner's Life" (German, Leipzig, 1878), and Miss Helen Zimmern's "Arthur Schopenhauer" (English, London, 1876). Frauenstadt's "Letters on Schopenhauer's Philosophy" (German, Leipzig, 1881), and his "Schopenhauer-Lexicon" (two vols., Leipzig, 1871), may also be referred to.

SCHORL is a common black variety of TOURMALINE, occurring in crystalline needles in many granites, especially near their surface of contact with sedimentary rocks. It is often met with in nests and radiating masses, but is of no value as a gem or in the arts.

SCHUBERT, FRANZ PETER, a great musical composer, was born at Lichtenthal, a district of Vienna, on 31st January, 1797, and died in Vienna on 19th November, 1828. He is the one great musician that Vienna has as yet produced. His father, of Moravian peasant origin, was the schoolmaster of a parish in Lichtenthal, and knew enough of music to teach its first elements to his three sons. His mother was a cook (like Beethoven's). The eldest child, Ferdinand, was born in 1794—was appointed professor of music in St. Anne's Normal School at Vienna in 1824—published several compositions, and became inspector of the music of the schools in the suburbs of Vienna, an office he filled till his death in 1859. He and Franz were, in 1801, placed under the tuition of Michael Holzer, the cantor of Lichtenthal, who, appreciating the singular gifts of the younger Schubert, interested himself to procure his admission, in 1809, as a singing boy into the imperial school (the *Conviect*) in Vienna, whence he passed into the choir of the imperial chapel in 1811. He kept this appointment till his voice broke in 1813; while he held it he practised the pianoforte and the violin, and acquired great proficiency on the latter. His remarkable power of production evinced itself very early; while yet a child he wrote quartets for string instruments and other pieces of high pretension. Salieri, to whom Beethoven

acknowledged his indebtedness, was very kind also to Schubert, and gave him a great deal of formal instruction, always looking on him as a pupil. Schubert's carelessness about what he wrote was almost as great as his fertility, in consequence of which certain friends, without his knowledge, took some of his compositions to a publisher, with whom they arranged to print them for the composer's advantage. Thus encouraged, Schubert wrote with still greater ardour, and with such rapidity that between 1812 and 1820 he composed above a hundred works of grand purpose and large proportions, among them several operas—eighteen in all, counting operettas. Unfortunately he was so easily satisfied with a libretto that he took any rubbish that happened to present itself, and scarcely one of these great works now holds the stage—all are crushed by the dullness of their plots and the silliness of their words. Schubert's works contain six masses and many of the Psalms and other portions of the Roman service; nine symphonies, of which the grand one in C is now universally played, and by common consent ranks with the great works of Beethoven and Mozart; while the unfinished symphony in B minor (two movements only completed) may be pronounced without hesitation one of the loveliest and most original conceptions in the whole realm of orchestral music (though Schubert himself is positively known never to have heard either of these immortal conceptions); twenty quartets for string instruments; two trios for pianoforte, violin, and violoncello; twenty-four sonatas, besides fantasias and other pieces, for the pianoforte, in almost every variety of form, &c. Even up to the present date, hitherto unknown products of his genius are from time to time being brought before the world. Schubert also composed some cantatas, among which "Prometheus" is specially admired, and a large number (about seventy-two) of four-part songs. The class of works, however, by which his name was first made famous in Germany and throughout Europe is his *lieder* (songs), of which 457 have been published, and many others are believed to exist undiscovered or to have been lost. The deep poetical purport manifest throughout all these, the melodic originality and vigour, and the enforcement of the expression by novel forms of accompaniment, distinguish them from all other vocal music. The rich variety of imagination they display is not less conspicuous, each song being an individual type, such as might have formed the nucleus of a composer's style. It is said of Schubert that his musical perception of the lyrical capabilities of a poem was instantaneous, and that his chief pleasure in composition was in giving musical expression to his prompt sense of the poet's meaning. Thus, one day, in 1826, he met a man reading Shakespeare, and looking over his shoulder, saw the song "Hark, hark, the lark at heaven's gate sings," read it, and at once said, "A lovely melody has occurred to me if I had but music paper." One of his friends dashed down some lines in pencil on the back of the bill of fare, and Schubert there and then wrote the exquisite song which is so deservedly famous. The faculty of stamping a decided character upon everything he wrote is not less evident in his instrumental music than in his songs. Of his immensely numerous productions (the whole list of Schubert's works runs to over 1100 numbers) a very small minority were printed during his life, and we owe in a great degree the publication of those which have appeared since his death to the enthusiastic zeal of Schumann, who, when he was at Vienna in 1840, took particular pains to collect Schubert's works, and to make arrangements for their passing through the press. Schubert's wonderful rapidity of invention may be regarded as unfortunate for his artistic character, since it tempted him to indulge in the act of producing rather than to pause to condense and correct; accordingly his great failing is diffuseness. Had Schubert possessed the power of concentration of Beethoven or Mozart

he undoubtedly would have been one of the greatest composers who ever existed, for in the divine gift of melody, in poetic insight, in mastery of tone-colour, he is fully their equal. It is in formal composition that he falls short of them. Accordingly, in small pieces, where this element scarcely exists, Schubert is at his best. "There are no songs in the world finer than "The Erl King," the "Ave Maria," "The Wanderer," or "The Young Nun" (a work which astonished Beethoven himself when shown to him). Schubert felt keenly the need of stricter study of the "dry bones" of music, and after an illness in 1828, which had given him a pause for reflection, he resolved to place himself under the tuition of Sechter, and planned with him a course of strict contrapuntal study, in the belief that this would give him such mastery in the art of construction as would enable him to fulfil in his subsequent works what he had only dreamed of in those he had previously produced. His somewhat sudden death put an end to these plans, to the world's great loss.

Schubert's life was lived in his immortal works: his mere earthly pilgrimage was very uninteresting. The few facts necessary to mention are as follows:—From 1814 to 1816 inclusive he taught in his father's school, probably as a means of avoiding the conscription. In 1816 he applied for the post of teacher in a government school of music at Laibach, near Trieste, but failed to obtain the appointment. Franz von Schober, a young gentleman of means, had come across some songs of Schubert's, and felt the absurdity of divine musical genius expending itself on the teaching of arithmetic, he therefore called on Schubert, and after a little trouble induced him to give up school and set up bachelor housekeeping with himself, he providing the expenses, or most of them. Schubert had already written at this time, among the immense mass of his work (for nothing but the cost of the paper and the time required for writing hindered the inexhaustible flow of melody in his brain), "Gretchen at her Wheel," "The Erl King," "The Fisher," "The Haidenröslein," "Rastlose Liebe," "The Wanderer," &c.; that is to say, magnificent songs which, taken as a group, excel all that have been written.

In the summer of 1818 Schubert was recommended by the musician Unger to Count John Esterhazy as resident teacher of music, and passed into the count's family, living in the summer at Zelenz in Hungary, and in the winter at Vienna. The whole Esterhazy family was very musical, and Schubert seems to have been properly appreciated, and very kindly, even generously treated. Musically the first result was a rush of Hungarian instrumental pieces from his facile pen. In 1819 the first public production of a song of Schubert's took place—a fact almost incredible, seeing what a vast store of beautiful songs were already in existence by him. The "Erl King" was not sung until 1st December, 1820, five years after its first composition. (Written in 1815, altered in 1816.) This was Schubert's fate all through. His splendid opera "Alfonso and Estrella," written in 1822 (to a worthless libretto as usual), was thought too difficult in the accompaniment, and was never performed till Liszt accomplished the feat in 1854, when Schubert had been in the grave nearly a quarter of a century. Capellmeister Fuchs, after another quarter of a century, took it in hand, rewrote the libretto, and produced it amid unbounded enthusiasm at Vienna in 1879, since which it has become a standard work.

The engagement with the Esterhazys became less absorbing as years went on, and Schubert was frequently lodging by himself. In 1825 he had a tour with his friend Vogl, the court singer, through the lovely scenery of the Salzkanmergut and Tyrol, and here Vogl created a profound sensation by his singing of Schubert's superb hymn to the Virgin, "Ave Maria." To this day old people are found who remember that tour, when Vogl sang to Schubert's accompaniment; and the friends were fêted everywhere.

Later on, in Vienna, Hummel heard them together, and the effect was so marvellously beautiful that he burst into tears. On his return to Vienna Schubert found the publishers at last awake to his merits, but in his entire ignorance of business he was most shamefully swindled. For the precious masterpieces now so cherished it will be scarcely believed that he received usually 10 gulden (8s.) for a song. Lachner has recorded that he took half-a-dozen of the *Winterreise* songs, familiar to all lovers of music, to Haslinger the publisher, and brought back 5s. for them in payment! (all the six had been written in one morning). Added to this he had formed a sort of partnership with Bassenfeld and Schwind, young artists, and often this resolved itself into Schubert paying for the three. They lived a jovial Bohemian sort of life, not seldom in great straits for money, and the wear upon the excitable brain of Schubert told very considerably. He had several somewhat serious attacks of illness. A great blow to him, in his now feeble state of health, was the death of his idol Beethoven (1827), and that, too, with the additional pang that the great composer had just become acquainted with Schubert's real work as he lay upon his deathbed. He at once sent for him, and saw him more than once, ordering him to "come in first" in his imperious way, and once going so far as to say before him to Hüttenbrenner, "You, Anselm, have my mind, but Franz here has my soul!" He liked to look at Schubert when he was speechless. At the funeral Schubert was a torchbearer, and after the ceremony drank with two friends solemnly to the memory of Beethoven, adding "and to the memory of him of us three who shall follow first." This was poor Schubert himself. Among Beethoven's papers were some anonymous poems for music, and Schubert set these in 1828 (some say following Beethoven's own wish); they form the famous *Scherengesang* (swan's song), and are his last great vocal work. In March, 1828, being low in finances, he gave his first great concert, and was rewarded with £32—to his delight, since it gave him leisure to write his noble symphony in C, spoken of above as one of the great instrumental works of all time. He also wrote his string quintet in C (with two violoncellos), his second work of the kind, and by far the finer: indeed it is acknowledged to be the grandest work of its kind yet produced. Probably the time spent on these great works (entirely unremunerative) was the cause of his crushing poverty at this time. The great E flat trio for piano, forte, violin, and violoncello brought him in 17s. 6d. How could a man live on such payment, even for the mere copying price? Some one offered to organize a concert for him at Pesth, and it fell through because he had not money enough to pay the diligence fare. He now became seriously ill, with attacks of giddiness and constant sickness, and his doctor most unfortunately fell ill also. Schubert was living in the outskirts of Vienna; his friends, perhaps, did not know he was so ill, perhaps were afraid of infection; and it came about that in his weakness and bitter poverty he was almost deserted, spending long hours alone in the bed from which he never rose again. Typhus fever at last declared itself on Monday, 17th November, 1828, and on Wednesday, the 19th, Schubert breathed his last. He was not quite thirty-two years old. His total effects were officially valued at £2 10s., including the music. Schubert was buried in the Ortsfriedhof (village cemetery) of Währing, three graves off from his hero, Beethoven.

In appearance Schubert was insignificant. He was short (5 feet 1 inch) and clumsy, somewhat stout, and round-shouldered, but his brilliant eyes made his face attractive, and though his complexion was pale and muddy his expression was very sweet and amiable. He was exceedingly retiring, and when Dabelli introduced him as a young man to Beethoven, he rushed from the house in

an uncontrollable fit of shyness. He detested admiration, and was, in consequence, much underrated, and another cause for this was his great simplicity of manners and fondness for good-humoured rough jokes. He does not seem to have ever been seriously in love, for the legend of his hopeless passion for the young countess, Caroline Estelhazi, is now believed to be altogether mythical.

SCHUMANN, ROBERT ALEXANDER, the great musical composer, was born at Zwickau in Saxony, on 8th June, 1810, and died at Endenich, near Bonn, on 29th July, 1856. Schumann evinced an early disposition for music; but his mother was strongly opposed to his predilection, and his father dying when the young enthusiast was but sixteen she became the sole arbitress of Schumann's career. He was accordingly sent to Leipzig in 1828 to study jurisprudence, and proceeded thence to Heidelberg the year following, where at a students' concert he gave his only public performance on the pianoforte. He had taken lessons on this instrument while at Leipzig of F. Wieck, a distinguished teacher, who succeeded in persuading his mother to withdraw her objection to Schumann's adopting music as a profession. His father had bequeathed him such a competence as rendered him independent of the drudgery of his craft, thus he had never to toil as a teacher, but could devote his entire energies to the cultivation and the exercise of his artistic powers. Schumann returned to Leipzig, and in the hope of overcoming the disadvantage of his late commencement of the systematic study of the pianoforte, applied his ingenuity to the discovery of some mechanical means for giving facility to the fingers, and so lessening the period of practice exercise. Unhappily the machine he employed to supersede practice so violently strained the muscles of the third finger of his right hand that he lost the use of it for ever. The mental infirmity which saddened the last years of Schumann's life was a hereditary disease—his eldest sister having lost her reason, and other members of his family having been to a greater or less extent similarly afflicted. His first attack was in the autumn of 1833, when he tried to throw himself out of his bedroom window on the fourth storey, the memory of which was such a ceaseless source of terror to him that he never afterwards would sleep in a room above the groundfloor. He began in 1834 the publication of the *Neue Zeitschrift für Musik*, of which journal he was ten years the editor, conductor, and principal writer. The articles he contributed to this paper are celebrated as some of the most genial and intelligent examples of musical criticism extant, and they secure for their author a high esteem as a writer on his art, wholly independent of his character as an artist. His attachment to Clara Wieck, the justly famous pianist, daughter of his old master, forms an important feature of this period of his life. She was born at Leipzig in 1819; her father long opposed their union, but they were married on 12th September, 1840, and as Madame Schumann she extended her former reputation, while she added not a little to that of her husband by her sympathetic performance of his music. The University of Jena granted him, at his request, a diploma in acknowledgment of the works he had already brought before the world, and his doctorship of music is dated the 22nd of February, in the year of his marriage. His frequent nervous excitement, especially after hearing music, caused Schumann's medical advisers to wish him to work less devotedly at his art and try and recover repose. He therefore gave up his journal and the professorship he held at his intimate friend Mendelssohn's newly founded conservatoire, and quitted Leipzig in 1844 for Dresden. Here, after a time, he undertook the direction of a vocal society, rendered vacant by the departure of his friend Ferdinand Hiller. He removed in 1850 to Düsseldorf, to follow Hiller there also, as music director; but whatever his other talents, he had never any qualification for a conductor, and his inefficiency for the office in-

creased with the rapid growth of his fatal malady to such an extent that his hand, who idolized him on his first arrival, at last refused as a body to play under him. He made a professional tour with Madame Schumann to Russia, and another to Holland. His disease had now increased to the utmost; he was haunted by the imaginary sound of one single note, from which he never could free himself, and which became his perpetual torment. A peculiar phase of nervous irritability made him suppose all musical performances to be too quick, and this groundless fancy caused him such painful excitement that at last he could not bear to hear music at all. He was subject to fits of silent abstraction, and though he liked to have his friends near him he would sometimes pass hours in their society without uttering a word. On the 27th of February, 1854, he had been thus seated for some time, when he quietly left his companions, and quitting home unobserved, he threw himself into the river, whence he was saved by some boatmen. This mournful event rendered it imperative to place him under restraint, and he was accordingly confined in an asylum in Endenich; there, at his request, he was provided with a pianoforte, playing on which he amused himself with most incoherent rhapsodies. He never regained his sanity, save, perhaps, for the few hours preceding his death, when he recognized the anxious friends who had drawn around him. We cannot contemplate such a close of such a career without a deep sense of melancholy at the painful frustration of powers that were so far above those of average men.

Schumann's symphony in B flat was first played at his wife's concert in Leipzig, in December, 1841; the "Overture, Scherzo, and Finale" in E was written in that year; the symphony in C was written in 1845-46, that in E flat in 1849, and that in D minor in 1851. His much admired cantata, "Paradise and the Peri," was composed in 1843 at the suggestion of the German translator of Moore's poem, the interpolated passages being written by him at Schumann's request: it was first performed at Leipzig. He wrote also the following cantatas for solo voices, chorus, and orchestra:—"Der Rose Pilgerfahrt," "Hermann und Dorothea," "Der Königsohn," and "Des Sängers Fluch," and likewise a mass and a requiem. His opera of "Genoveva" was composed in 1847-48, and performed at Leipzig in 1850, but had only three representations. Its overture, however, is frequently played in the concert-room. His overture and incidental music to Byron's "Manfred" was written in 1848, and first performed at Weimar in 1852. The beautiful incidental music for Goethe's "Faust" was written at four different periods. The first movement of his single pianoforte concerto was designed as a separate piece in 1841, and the work was subsequently extended into its present form. It ranks with the very finest works of the kind, highly poetical, with a delightful play of fancy. This was written for Madame Schumann to play, like his other concerted pianoforte music—namely, the *Phantasiestücke* for pianoforte, violin, and violoncello, and the trios in D minor, in F, and in G minor, the quintet, the quartet, and the two sonatas for pianoforte and violin. The three violin quartets were published in 1841. Schumann also wrote many songs, which are characterized by their intensity of expression, some other instrumental pieces of importance, and a great number of tiny compositions for children, among which not a few of his very happiest thoughts are to be found. The distinctive peculiarity of all Schumann's music is its intense meaning, its deep-lying poetical enthusiasm; and a like single-hearted fervour is to be found in those wonderful criticisms which did so much to revive and restore the musical art in Germany. His style is most mannered; his works are involved, usually difficult both to phrase and to perform, but it is a mannerism which is very precious and a difficulty that repays tenfold the

trouble it causes to conquer it. In consequence, Schumann is a favourite composer with all the greatest artists of the present day. As a song writer Schumann excels Mendelssohn, and fairly takes rank as almost the equal of Schubert. In instrumental works of great scope he is hampered by want of early familiarity with anything but the pianoforte, but his great genius triumphs even over these deficiencies. His pianoforte quintet stands admittedly at the head of all the few works of its class. It may be regarded as perhaps Schumann's finest work, and is perfect in every way.

In person Schumann was solidly built, and stood above the middle height, his features somewhat heavy, and of a markedly Teutonic type. He was almost morbidly silent and grave in company, though so vigorous and outspoken in his writings. Wasielewski's "Life of Schumann" (English translation, 1878) is a very poor biography, but as yet it is the only one. Reissmann produced an excellent account of Schumann from the critical side, based as to biographical facts upon Wasielewski, in 1865, and a very faulty English translation of this appeared in 1886.

SCHÜTZ, HEINRICH (Lat. *Sagittarius*), called the "father of German music," was born in the year 1585, at Kösteritz, a village on the river Elster in Voigtland. His grandfather was a privy councillor, and his father a burgo-master of Weissenfels. In 1599, having distinguished himself at the University of Marburg, he was introduced to the Count Palatine Moritz at his court of Hesse-Cassel, who, at his own expense, placed him under the tuition of Gabrieli, at that time a celebrated musician at Venice. Schütz accordingly went to Venice, and continued there until the death of his master in 1612. He then returned to Hesse-Cassel, and the Count Palatine settled on him an annual pension of 200 guilders. In 1628 he returned to Italy for a time, and then went to Copenhagen in 1634, and in 1642 he was made director of music to the King of Denmark. He died at Dresden in 1672. He composed and published many noble works, chiefly consisting of sacred music for voices. The thing that makes Schütz memorable in the history of music is the fact that with the exception of a book of Italian motets, published at Venice in 1611, all his music was written to German texts. Moreover, he is the composer of the first German opera on record, the libretto being a translation of Rinuccini's "Dafne," which was set by Schütz in 1627, and marks an epoch in the art. Schütz's "Resurrection," written in 1623, was the first German oratorio, parent of the great works of Bach and Handel, both of whom were exactly one century his junior. The tercentenary of the birth of Schütz was celebrated with much enthusiasm in Germany in 1885.

SCHWAN THALER, LUDWIG MICHAEL (1802-48), was a sculptor of great original power, with which he succeeded in revivifying the worn-out subjects of classical and religious legend. In his fiery eagerness he has sometimes overlooked the necessity for finish, and most of his work has in some part or another an air of incompleteness. His work is familiar to those who have visited Munich. He was a native of the town, and rose to the position of confidential art-adviser to the æsthetic King Ludwig I. The extent of the work he accomplished is marvellous. The well-known pediment-sculptures of the Walhalla, and the splendid colossal bronze statue of Bavaria (over 58 feet high, standing on a pedestal of 27 feet), are by Schwanthaler, as well as the vigorous statues of the generals Tilly and Wrede, in the Hall of the Marshals. The casting of the great statue was not completed till 1850, so that Schwanthaler never had the satisfaction of seeing his greatest work complete. Among colossal statues this is certainly one of the most successful.

SCHWARZ, CHRISTIAN FRIEDRICH, an eminent German missionary, was born 26th October, 1726, at

Sonnenburg, in Prussian Brandenburg. In his twentieth year he entered the University of Halle, where he was appointed to learn the Tamil, in order to superintend the printing of a Bible in that language which, however, was not carried into effect; but the knowledge of the Tamil which Schwarz had acquired caused a proposal to be made to him by the Danish Missionary Society that he should take orders and go to India as a missionary. He accepted the proposal, went to Copenhagen, where he was ordained, and reached Tranquebar, on the Coromandel Coast, in July, 1750.

Schwarz continued to labour with the Danish mission till 1766, when he transferred his services to the London Society for Promoting Christian Knowledge. He now took up his abode at Trichinopoly, where he had founded a church and school, and removed to Tanjore in 1778. Here he laboured with much devotion and success. His personal influence and the respect in which he was held by the natives are evinced by his being the only ambassador whom Hyder Ali would admit to his presence, and by his being able to persuade the suspicious and reluctant native farmers to bring food to the starving inhabitants of Tanjore on his personal pledge of payment. He died at Tanjore, 13th February, 1798. From 1787 he had been tutor and guardian to the son and heir of the Rajah of Tanjore, who erected a monument to his memory in the mission church there, while the East India Company also placed a monument to him in St. Mary's Church, Madras. He aided Schultze in translating the Bible into Tamil. See his "Life and Correspondence," by Dr. H. Pearson (1839).

SCHWARZBURG-RUDOLSTADT, a small principality in Germany, and part of the German Empire, consists of several isolated portions between Prussian Saxony, the Saxon duchies, and Reuss. The area is about 374 square miles, and the population in 1880 was 80,296. It is watered by the Ilm, Schwartz, and Saale, and has some very beautiful scenery. The surface is, however, rugged, and the soil by no means fertile. Perhaps the most important crop is flax, the culture of which is almost universal. A large portion of the land is devoted to pasture, and great numbers of cattle are reared. The minerals include lead, iron, and salt, all of which worked to a considerable extent. The principal manufactures are woollen stuffs, iron-ware, glass, and porcelain. The chief export, in addition to the minerals and manufactures, is wood. The government is a monarchy, in which the power of the sovereign is limited by that of the states, or *Geheimraths-collegium*. For administrative purposes the principality is divided into the upper lordship of Rudolstadt and the lower lordship of Frickenhausen, and subdivided into ten bailiwicks. The public debt is about £150,000. The revenue and expenditure are each rather more than £90,000 per annum. The capital is Rudolstadt.

SCHWARZBURG-SONDERSHAUSEN, a small principality forming part of the German Empire, and consisting of several distinct portions between Prussian Saxony and Saxe-Gotha. The area is 318 square miles, and the population in 1880 was 71,107. The surface is undulating and the country is watered by affluents of the Unstrut. It is more fertile than Schwarzburg-Rudolstadt, producing corn, which, after satisfying the home consumption, leaves a small surplus for export. One of the principal sources of revenue is derived from the forests, which furnish excellent timber. Flax is extensively cultivated, and numbers of cattle, sheep, and swine are reared. The minerals include iron, alum, schist, and copper. The first supplies several smelting furnaces and forges, and from the two last much alum and vitriol are made. After these, the only manufactures of any importance are porcelain, hardwares, linen and woollen cloths, and potash. The principal exports are corn, wool, wood, ironware, i

alum, vitriol, lampblack, rosin, and fat cattle. The powers of the sovereign are unlimited. For administrative purposes the principality is divided into the upper lordship of Arnstadt and the lower lordship of Sondershausen, and subdivided into seven bailiwicks. The inhabitants are almost all Lutherans. There is a public debt of about £200,000. The annual revenue and expenditure are each about £112,000. The capital is Sondershausen.

The princes of the house of Schwarzburg belong to a very ancient and wealthy family, which gave an emperor to Germany in the fourteenth century. It was partly on account of this lineage that the small territory of the house was left undisturbed at the Congress of Vienna, instead of being "mediatized," like that of a number of other formerly sovereign princes.

SCHWARZENBERG, HOUSE OF, one of the most eminent of the noble families of Germany, rose into note early in the fifteenth century, when a certain Erkingen von Semsheim, lord of Schwarzenberg in Franconia, was created by the Emperor Sigismund a baron of the empire. The importance of the family dates from the time of Adam, count of Schwarzenberg, who was the chief counsellor of George William, elector of Brandenburg, during the Thirty Years' War. Karl Philipp, prince of Schwarzenberg, his illustrious descendant, born at Vienna, 15th April, 1771, won for his race a European reputation. Having entered the Austrian army at an early age, he soon rose to high rank, and both at Ulm and at Austerlitz distinguished himself by personal courage and military skill. After the treaty of Vienna, in 1809, he was employed in a diplomatic capacity, and negotiated the matrimonial alliance between the Archduchess Maria Louisa and the Emperor Napoleon. He commanded the Austrian contingent of the Grand Army which accomplished the invasion of Russia in 1812, and at Pultusk concluded an armistice with the Russians, which secured the retreat of the famine-stricken remnant of Napoleon's host. When the European powers united in a coalition to effect the downfall of the French emperor, Schwarzenberg was placed at the head of the allied forces. In 1813 he won the three days' battle of Leipzig, and his able strategy gradually drove back the French upon their own frontier, and largely contributed to their ultimate overthrow. For his services as a general and a statesman he was liberally rewarded by the Austrian emperor, whose confidence he enjoyed until his death, at Leipzig, 15th October, 1820.

SCHWARZWALD, one of the four circles of the kingdom of Württemberg, derives its name from the principal range of mountains, the Schwarzwald, or Black Forest. The face of the country is mountainous and woody. The Black Forest covers all the western part. Timber, cattle, game, fish, and minerals are abundant; but the soil is not suited for agriculture.

The country people spin yarn, thread, and worsted, and manufacture ticking, worsted stockings, caps, and muslin; and there are larger manufactures of leather, paper, oil, clocks, toys, glass, iron, wooden wares, and chemicals.

SCHWERIN, a town of Germany in the duchy of Mecklenburg-Schwerin, finely situated on the lake of its name, 60 miles E. of Hamburg. It is walled and well-built, and has a large and ancient Gothic cathedral, a castle and arsenal, a synagogue, town-house, gymnasium, theatre, picture gallery, veterinary and other schools, a mint; and manufactures of woollens, linens, chocolate, lacquered ware, &c. The population in 1880 was 30,146.

SCHWYZ, one of the central cantons of the Swiss Confederation, which has given its name to all Switzerland, that country being called Schweiz in German. The canton lies on the west side of the high Alps of Glarus. It consists of several long valleys between lower cliffs of the Alps, the summits of which are from 4000 to 6000 feet high, and of a plateau or table-land in the

centre of it. The principal valleys are the Waggi Thal in the north, the Sihl Thal in the middle, and the Muota Thal in the south. The waters of the northern part of the canton run in a northerly direction into the Lake of Zurich; those of the centre northwards by the river Sihl into the Limmat; and those of the southern portion southwards into the Waldstatter Lake. Besides bordering on those two lakes, the canton embraces within its territory the southern part of the Lake of Zug, and it also entirely incloses the small Lake of Lowerz. Northwest of the latter, and between it and the Lake of Zug, is the valley of Goldau, between Mount Rigi and the Rossberg.

Schwyz is bounded by the cantons of Glarus, St. Gall, Zug, Luzern, Unterwalden, and Uri. The area is 350 square miles. The population in 1880 was 51,325.

The vine and some fruits are cultivated, but cattle breeding is the chief occupation, and the farming produce is considerable. The manufactures are only such as are required for home use. The principal exports are cattle, cheese, and timber. The language of the people is a Swiss-German dialect, which differs little from that of Zurich; it is full of guttural sounds, and the inhabitants accentuate the words strongly.

Schwyz, the capital of the above canton, is situated near the Waldstatter Lake. It is an open town, and has two good streets, a large square, a very handsome church, two convents; a town-house, with a collection of historical paintings; an arsenal, with national trophies; an hospital, which serves also as a prison; a library belonging to the town, which is rich in works relative to the history of the country; a cabinet of medals; and 5800 inhabitants, including the surrounding villages.

Schwyz was one of the three original Swiss cantons. It now holds the fourth place. The government is a pure democracy, the sovereign power being entirely intrusted to the people at large. At the age of sixteen every male inhabitant is enrolled in the militia, and they all assemble at the capital annually to exercise legislative power. The executive duties are intrusted to a council of ninety members.

SCIADOPITYS is a genus of plants belonging to the order CONIFERÆ and tribe ARATCARIÆ, and only found in Japan. *Sciadopitys verticillata* has been in cultivation for centuries by the Japanese in the vicinity of their temples, but has not been long introduced into our gardens. It grows to a height of from 100 to 150 feet; the branches are whorled and the linear leaves crowded at the ends of the branches. The cones are nearly globose, with bracteate scales, and five to eight seeds, ripening in the second year.

SCIENIDÆ is a family of fishes belonging to the order ACANTHOPTERYGII. The body is somewhat elongated, compressed, and covered with ctenoid scales. The soft dorsal fin is more developed than the spinous dorsal or the anal fin; the ventrals are thoracic, with one spine and five soft rays. There is often a projecting snout. Teeth are found only in the jaws, and are usually fine, conical, and arranged in bands. The mucous system of the head is well developed. The air-bladder has frequently numerous appendages. About a dozen genera are included in this family. They are chiefly inhabitants of the coasts washed by the tropical and subtropical waters of the Atlantic and Indian Oceans, entering the mouths of large rivers. Some are entirely fresh-water forms. Most of these fishes are edible. Many of them attain a large size. The MAIGRE (*Sciæna aquila*), which is caught on British coasts, belongs to the typical genus *Sciæna*, of which some fifty species are known, many of them from the fresh-water lakes and rivers of North America. The genus *Umbrina* contains a fish well known to the ancients, the Ombre or Corvo (*Umbrina cirrhoa*), common in the

Mediterranean, but a rare visitor to British coasts. It occasionally attains a weight of 40 lbs., and the flesh is much esteemed in the countries in which it is common. The DRUM-FISH (*Pogonias chromis*), found on the south-eastern coasts of North America, is remarkable for the extraordinary drumming noise which it makes. Other members of the family have the power of producing sounds.

SCIATICA is a form of neuralgia which affects the large nerve running down the back of the thigh, called the sciatic nerve. The disease may be induced by exposure of the limb to a draught of cold air, to the sitting on a cold or damp seat, excessive muscular exertion, rheumatic or gouty inflammation of the sheath of the sciatic nerve, the pressure of the womb during pregnancy, concussion of the spine, and several other causes. The symptoms are severe pain, variously described as shooting, darting, screwing, tingling, or burning, which is felt chiefly in the neighbourhood of the hip-joint, or may extend almost to the foot. It arises independently of muscular movement, but it is usually greatly aggravated by exertion, and when the pain is at its height a certain powerlessness of the muscles of the limb is apt to be experienced, while cramp of the calf muscles is not uncommon. There are great differences in the course and character of this affection, which occurs especially during the middle age of life, and often assumes a chronic character, not difficult to relieve, but very difficult to cure.

The treatment of sciatica must be constitutional as well as local, and where it arises from gout, rheumatism, syphilis, or malaria, special remedies appropriate to these affections will be required. Local treatment consists in insuring warmth and rest for the affected limb, and in severe cases it is a good plan to put the patient upon a water mattress. The application of hot linseed poultices will often greatly relieve the pain, and where these are insufficient counter-irritation, by the application of the blistering fluid, or the use of small blisters about the size of a crown piece, one following another as it heals on a closely adjoining piece of skin, may be tried. Other methods are acupuncture or the pricking of the sheath of the nerve in a few places with a sharp needle, galvanism, and the application of ice or ether spray. An old-fashioned remedy which is still adopted by many practitioners is turpentine, given in doses of twenty drops in a little milk three times a day. In severe cases where the pain causes complete prostration hypodermic injections of morphia are called for.

SCIENCE. The word *scientia*, in Latin, simply means knowledge, and we must attribute the subsequent application of the word to particular kinds of knowledge, to causes similar to those which have influenced the use of the equally general term *mathematica*. It does not appear that in the earlier parts of the middle ages science had any distinct meaning as opposed either to literature or to art. Almost at the earliest establishment of universities the great preliminary branches of knowledge were separated from the rest under the name of liberal arts; that is to say, the Trivium, containing grammar, logic, and rhetoric; and the Quadrivium, containing arithmetic, geometry, astronomy, and music. How the word grew it is not our business to inquire closely, but by the middle of the sixteenth century the word *science* had begun to appear as denoting connected and demonstrated knowledge, in opposition to *art*, which signified digested rules of operation not connected with each other by deduction from common first principles. Our best teachers of the present day are never weary of reiterating the fact that science is only highly organized knowledge, differing in nothing from common knowledge save its accuracy and constant testing and verification. Professor Huxley says truly, "The mode of investigation which yields such wonderful results to the

scientific investigator is in nowise different in kind from that which is employed for the commonest purposes of everyday existence. Common sense is science exactly in so far as it fulfils the ideal of common sense; that is, sees facts as they are, or at anyrate without the distortion of prejudice, and reasons from them in accordance with the dictates of sound judgment. And science is simply common sense at its best, that is rigidly accurate in observation and merciless to fallacy in logic" (The Clay-fish).

The six main sciences, under which all knowledge is at present comprised, are these:—(1) *Mathematics*, the science of quantity, the most general and universal of properties, including arithmetic, algebra, the various forms of calculus, geometry, &c. (2) *Physics*, which deals with the general attributes and states of matter, and considers such subjects as mechanics (dynamics, statics, kinetics), hydraulics and hydrostatics, pneumatics, acoustics, light, heat, magnetism, and electricity. The last four are grouped frequently as molecular physics, and the whole group is frequently termed Natural Philosophy. Astronomy, the science of the universe, and geology and physical geography, the sciences of the history of our earth, are large separate departments of physics. (3) *Chemistry* is the science of the inner composition of the matter of the world out of a few elements, and traces the manifold new substances, often with entirely new properties, which the addition or subtraction of elements produces. The respective elements, usually somewhat precise and definite, in which elements combine is a large department of chemistry. (4) *Biology*, the science of living things, with two subdivisions: physiology, animal and vegetable, treating of functions; and botany and zoology (natural history), treating of classification and description. Anatomy, embryology, and the comparative biological sciences are other allied branches. (5) *Psychology*, the science of mental phenomena, embraces the whole subjective side of man's nature, and a large department of it was formerly dignified with the special name of Philosophy. The problems of the origin of knowledge, the nature of knowledge, the limits of the mind, the process of reasoning, &c., come within its scope. A practical side is given by logic and education. (6) Finally, the study of man as a race, or *sociology*, now ranks as a group of sciences. The scientific side of history (philosophy of history), the comparative views of anthropology and ethnology, the consideration of the various governments, legal codes, manners and customs, and the elucidation of the problems of wealth, under the name of political economy—these are some of the chief branches of sociology, which, it is evident, is to a very large extent connected with psychology.

SCILLIPIC RIN and **SCILLITOXIN** are two principles obtained from the squill bulb (*Scilla maritima*, natural order Liliaceæ). Scillipierin is a yellow hygroscopic powder, soluble in water. It is used in medicine and acts powerfully on the heart, retarding its action. Scillitoxin is a brown powder, soluble in alcohol, but insoluble in water and in ether. It has a bitter burning taste, and is very poisonous. The powder irritates the nostrils. It arrests the action of the heart.

SCILLY ISLANDS, a remarkable group of islands lying off the Land's End in Cornwall. The lighthouse on St. Agnes, one of the southernmost of the group, is at 49° 53' 38" N. lat. and 6° 19' 23" W. lon. The area of the whole is about 3560 acres, or somewhat less than 7 square miles; and the aggregate population at the census of 1881 was 2315.

It is believed that the Scilly Islands were at some remote period part of the mainland of Cornwall, and were disjoined by the action of the sea. There are more than 140 islands; but a large part of them are uninhabited. Those which exceed 100 acres each in ex-

tent are St. Mary's, Treseaw, St. Martin's, St. Agnes, Bryher, and Samson. The islands form a compact group, surrounded by a deep sea, from which they rise for the most part abruptly, with rugged sides. In the channels which separate them from one another the depth of the sea is much less; and in several parts extensive flats, some of them dry at low water, and others covered with water only knee-deep, extend from island to island. The islands and rocks consist almost entirely of granite. The climate is so mild that many semi-tropical plants flourish in the open air, but the islands are subject to sudden storms.

ST. MARY'S, the most important island, is about 2½ miles long by 1½ broad. The area is 1528 acres. It consists of two portions, the smaller of which, called "the Hugh," is united to the other by a low sandy isthmus, on which stands Hugh Town, the principal place in the island, and a good harbour. The soil is generally good; about one-half of it is in cultivation, and produces luxuriant crops of corn and potatoes. Hugh Town consists of one principal street, very crooked, and of several lanes, alleys, and courts; the houses, which are chiefly built of stone procured in the neighbourhood, are small and irregular; there are a few public buildings and a pier extending into St. Mary's Pool. The church, built in 1835, contains memorials to Sir Cloudesley Shovel and his men, who were wrecked on the Gilstone rock in October, 1707. Of the crews of three men-of-war only one man was saved. The Hugh is a steep hill rising about 110 feet above the level of the sea, fortified by lines having a circuit of more than a mile, with eighteen bastions or batteries, and inclosing a small fort called Star Castle, and barracks for the officers and troops, erected in 1593.

TRESEAW, the island next in importance, is inhabited chiefly by pilots and fishermen. Here is the mansion of the lord proprietor of the islands, built on the site of the old Saxon abbey of Treseaw. The abbey ponds cover 50 acres. Shipman's Head is a rugged promontory of considerable elevation. On the west coast are the ruins of Charles' Castle, 155 feet above the sea, and immediately over a circular tower and battery, called Oliver Cromwell's Castle. Piper's Hole is a cavern upwards of 600 feet long. The other inhabited islands are Bryher, St. Martin's, St. Agnes, and Samson. Two lighthouses have been erected on the islands.

The natural produce of the Scilly Islands consists of a thin short grass intermixed with camomile, heath, and dwarf flax; fern and moss are found near the shore. Among the cultivated produce are potatoes, wheat, rye, and garlic. There are horses, cattle, sheep, and pigs. Game and poultry are less numerous than formerly.

The entire group belongs to the duchy of Cornwall, and are in the diocese of Exeter. A military commandant at St. Mary's and a collector of the customs are appointed by the authorities in London. The tithes belong to the duchy.

The Scilly Islands are generally considered to have been the Cassiterides or Tin Islands of the Greeks. [See CASSITERIDES.] It is, however, most probable that the western extremity of Cornwall was included under this term; at all events, there are now very slight traces of mines of any sort in any of the islands. Mr. Woodley supposes them to be the Gstryimides of Festus Avienus ("Ora Maritima," 94, *et seq.*) The conquest of South Britain by the Romans must have led to the discovery of their proximity to the mainland. From the time of the Romans, who used them occasionally as a place of banishment, there is no notice of them in history until their conquest by Athelstan, king of England, who expelled the Danes about 938. Henry I. granted them to the abbey of Tavistock, and they were afterwards conferred by Queen Elizabeth on the Godolphin family. Prince Charles

(Charles II.) took refuge here in the Civil War, and they were fortified by Sir John Grenville on behalf of the king. In 1830 they reverted to the crown, who leased them to Mr. Augustus Smith, by whom they were held for more than forty years. Of their ancient importance they retain little trace, but some Druidical monuments still remain.

SCIM'TAR, the name given to a sword having a curved blade which is narrowest at the hilt and broadest at the point. The cutting edge is on the convex side of the blade, and the shape enables a very heavy blow to be given, but the weapon is powerless for thrusting purposes. It is a favourite weapon among Turks, Persians, and some other Eastern peoples.

SCINC'IDÆ. See SKINK.

SCINDE. See SIND.

SCINTILLATION, by etymology, should and does mean the act of emitting sparks (Lat. *scintilla*), but is more often applied to the sparkling, flickering light of the fixed stars, often called familiarly "twinkling." The phenomenon cannot yet be said to be explained, though theories on the subject are often put forward by astronomers; nor is the reason known why the planets do *not* (except in rare cases) scintillate. Recent experiments have definitely shown that the phenomenon is due to our own atmosphere, and it may almost be regarded as certain that its explanation will be found among those theories which regard it as the result of the splitting up of the light into separate rays of diverse colours (that is, of diverse wave-lengths) by refraction, acting in such a manner that some of the rays are also retarded (analogically to the retardation causing the chromatic aberration of lenses); the light consequently arriving not in a steady stream, but in fitful bursts, often of changing colours. It is possible that, as the planets shine by reflected light alone, this may be the cause of their greater steadiness of light.

SCIO, the ancient *Chios*, called by the modern Greeks *Khio*, is an island of Asiatic Greece, near the west coast of Asia Minor. It lies at the entrance of the Gulf of Smyrna, and is separated from the mainland by a channel about 8 miles wide. Its length from north to south is about 30 miles, and its greatest breadth about 18 miles. It has a rugged but finely diversified surface, and produces mastic, which may be considered its staple, wine, oil, cotton, silk, and fruit. The island has four harbours, the best being that of Delphine (Kato Pliana), on the south coast. Chios was one of the twelve Ionian states founded by the European colonists from Greece, and it was one of the places that claimed Homer as a native.

After the close of the Persian War, B.C. 480, the island passed successively under the dominion of the Athenians, the Macedonians, the Romans, and the Byzantines. The Genoese took it in 1346, and it was governed for a long time by the Genoese family of Giustiniani. Soliman the Great took it in 1566. In 1694 it was taken by the Venetians, but was soon after retaken by the Turks, and allotted as a kind of jointure to the Sultana mother. The people of Chios had their own magistrates, and lived in comparative freedom and security. In 1822 the islanders, having taken part in the Greek insurrection, suffered severely from the Turkish revenge. In 1881 the island was visited by a succession of earthquakes, during which it is believed nearly 8000 of its inhabitants were killed. The present population is about 40,000.

The wines of Chios, especially those produced in the district of Arvisia, were among the most esteemed of any in the ancient world. Thus Horace asks

"Quo Chium pretio cadum
Mercemur?"

According to Pliny, Chian wine was served up by Julius Cæsar at his most splendid entertainments; and it is thought worthy of notice, that Hortensius left a very large stock of this famous beverage to his heir.

SCIP'IO is the name of a family belonging to the patrician gens *Cornelia*, which produced some of the greatest of the ancient Romans.

Publius Cornelius Scipio, son of *L. Cornelius Scipio*, was consul in the first year of the Second Punic War (218 B.C.) He went to Spain, but hearing that Hannibal was preparing to cross the Rhone, returned by sea to Massilia (Marseilles). Hannibal's movements anticipated his plans, and the Carthaginian army crossed the Alps. Scipio embarked for Italy, and in the first engagement on the Ticinus, the Roman cavalry was defeated by the Carthaginians. Scipio then took up a position on the Trebia, and waited for the arrival of his colleague Sempronius from Sicily, when a battle was fought in which the Romans were completely defeated.

In the summer of B.C. 217, Scipio was sent with a force into Spain, where his brother Cneius, who was his legatus, had carried on the war successfully against the Carthaginians. By defeating the enemy, and taking their general (Hanno) prisoner, Cneius became master of most of the country between the Ebro and the Pyrenees. In B.C. 216 the two brothers defeated the Carthaginian general Hasdrubal, who escaped with only a few men. In the meantime, Mago arrived with a new army from Carthage, but this fresh force was twice defeated by the Romans. The Scipios were successful in Spain until B.C. 212, when the Carthaginians mustered a large force, and took a large body of Celtiberi into their pay. Publius fell in battle against Mago and Hasdrubal the son of Gisco; and about a month after, Cneius and his forces were also cut to pieces by the Carthaginians. This calamity happened in the spring of B.C. 211.

P. Cornelius Scipio Africanus Major, the son of *P. Cornelius Scipio*. If it be true that at the age of seventeen he fought in the battle of the Ticinus (218 B.C.), he must have been born in 235 B.C. He served in the battle of Cannæ (216 B.C.) as a tribune, and was among those who escaped to Canusium. Here the chief command of the remaining troops was unanimously intrusted to him and Appius Claudius Pulcher. On this occasion it was owing to his presence of mind that the remnants of the Roman army did not in their despair quit Italy. In 211 B.C. his father and uncle fell in Spain, and Scipio was ordered there to command with proconsular power, being then scarcely twenty-four years of age. About the middle of B.C. 210 he set out for Spain, and landed at the mouth of the Ebro. New Carthage was soon reduced, and Scipio's generous treatment of his captives won over the Spaniards to him. His victorious and popular career showed Hasdrubal that the Carthaginian power was doomed in Spain. Hasdrubal therefore assembled all the forces he could get together and left Spain with his army to join his brother Hannibal in Italy. Fresh arrivals from Carthage were also defeated by Scipio, and in B.C. 207 Gades, the last Carthaginian possession left in Spain, fell into his hands.

About the end of B.C. 206 he returned to Rome with an immense booty, which was paid into the ærarium or public treasury. In B.C. 205 he was elected consul. He obtained the command in Sicily with thirty ships, and permission to cross over to Africa, if he should think it advantageous for the state. It was his favourite scheme to divert Hannibal from prosecuting the war in Italy by attacking Carthage itself. He accordingly landed there B.C. 204 with a large force, and defeated Hasdrubal. The Carthaginians soon afterwards sued for terms of peace. Scipio was willing to grant it on terms favourable to the Romans; a truce was made, and a Carthaginian embassy sent to Rome. In the autumn of B.C. 203 Hannibal returned to Africa as the last resource to save the tottering African city. In B.C. 202 the war was ended by Scipio defeating Hannibal near Zama, and peace was concluded on terms which destroyed the independence of Carthage.

On his return to Italy, Scipio entered Rome in triumph, and was henceforward distinguished by the name of *Africanus*. In 199 B.C. he was censor with *P. Ælius Pætus*, and in 194 B.C. he was made consul a second time with *Tib. Sempronius Longus*. In 190 B.C. Africanus accompanied his brother Lucius, who was then consul, to carry on the war against King Antiochos. He acted as the legatus of Lucius in this campaign, which was terminated by the great battle near Sipylus, in which Antiochos was defeated. Lucius received the honourable surname of *Asiaticus* on this occasion. The consul granted the king reasonable terms of peace, but they were made much more severe when the treaty was ratified at Rome; and when the two brothers returned to Rome they were charged with having accepted bribes from Antiochos, and having retained part of the booty which should have been delivered up to the ærarium. Lucius produced his accounts, but Publius in his haughty way snatched them from his hand and tore them up indignantly. Lucius was fined, and Africanus being summoned before the popular assembly, only saved himself by reminding the people of the battle of Zama. He withdrew, in deep anger at his country's ingratitude, to his villa near Liternum, on the coast of Campania, where he spent the rest of his life in quiet retirement. The estates of his brother were seized to the public use (B.C. 187), but they did not produce the amount of the fine. His friends and clients would have made him even richer than before, but he refused everything beyond what was necessary for his support. The year of Scipio's death is not certain. Polybius places it in B.C. 183, the same year in which Hannibal and Philipomenus died; other accounts place it in B.C. 185. Scipio was a great commander, but we have no evidence of his qualities as a statesman. By his wife, the daughter of Æmilius Paulus, he had two sons and two daughters, one of whom was Cornelia, the wife of Sempronius Gracchus, and the mother of the Gracchi.

P. Cornelius Scipio Æmilianus Africanus Minor, son of *L. Æmilius Paulus*, and the adopted son of *P. Cornelius Scipio* (eldest son of the great Africanus), was born about 185 B.C. From his youth he cultivated the friendship of Polybius, Panætius, Ælius, and others. But with his partiality for science and Greek refinement and art, he esteemed no less the stern virtues of the old Romans. Cato the Censor was in this respect his model. He was elected consul for B.C. 147, though he had not attained the legal age, and Africa, where the Third Punic War was now raging, was assigned for his province. He was accompanied thither by the Greek historian Polybius and his friend Laelius. He had already served in Africa, and had made saved the Consul Manlius from defeat by his military skill. He restored confidence and discipline in the Roman army, and he cut off the supplies of the Carthaginians. His command being prolonged to 146 B.C., he made his assault on the city of Carthage, which he took after a desperate resistance, and which, by a decree of the senate, was razed to the ground. On his return to Rome he entered the city in triumph. In 142 B.C. Scipio was censor with *L. Mummius*, and in the midst of an age of universal luxury he exercised the office with impartial severity. The war against Numantia in Spain having long been unsuccessfully carried on, Scipio was elected consul for B.C. 134, during his absence from Rome, attending to Roman affairs in Egypt and Asia. On arriving in Spain he found the Roman army in a bad state of discipline, but he soon restored order and continued the siege of Numantia till the inhabitants were compelled by famine to yield, and the place was razed to the ground. It was during the siege of Numantia that the disturbances commenced at Rome over the agitation of Tiberius Gracchus. Scipio, though the husband of Sempronia, the sister of the Gracchi, approved of the violent measures of the senate against his brother-in-law Tiberius, who lost his life B.C. 133. After his return to

Rome he steadily opposed the carrying out of the agrarian laws of *Liberius Gracchus*, and among other things he made a proposal in favour of the old Italian veterans, which was approved by the senate, with respect to the distribution of the public land. This measure produced a delay in the distribution itself, and the popular leaders, *Flaccus*, *C. Gracchus*, and *Papirius Carbo*, commissioners under the law of *T. Gracchus*, made the bitterest invectives against *Scipio* in the assembly, and called him the enemy of the people. After the fierce debate *Scipio* went quietly home accompanied by the senate, the Roman citizens, and a great number of Latins and Roman allies. In the evening he went into his bedroom with the intention of writing a speech to be delivered the following morning. But in the morning he was found dead in his bed (129 B.C.) There was no inquiry into the cause of his death, but public opinion pointed out many who were suspected of having murdered him, and the heaviest suspicion fell upon *Carbo*. *Cicero* distinctly names him as the murderer of *Scipio*.

The family tomb of the *Scipios* at Rome was first discovered in 1616, but it was soon forgotten. In 1780 the tomb was again discovered close by the modern gate of *San Sebastian*. In the course of a year the whole catacomb, though in a dilapidated state, was cleared and laid open. The inscriptions and other curiosities, among which was the beautiful sarcophagus of *Scipio Barbatus*, were transferred to the *Museo Pio-Clementino* at Rome. *Scipio Africanus Minor* is one of the most fascinating characters in Roman history, uniting the proud courage of the Roman with the love of letters and art of the Greek; stamless and perfectly honorable and trustworthy, he would doubtless have reorganized the state had his life been spared. *Cicero* has immortalized him by making him one of the characters in his great dialogue on "Friendship." *Laelius*, the faithful friend of *Scipio*, is also introduced in that great work.

There are several other highly distinguished Romans of this family, whose achievements, however, the limits of the present work will not permit to be recorded.

SCIROCCO. See *SHROCCO*.

SCIRRHUS. See *CANCER*.

SCISSOR-BILL or **SKIMMER** (*Rhynchops*) is a genus of birds belonging to the Gull family (*LARIDÆ*). These birds are distinguished by the character of the bill, which is longer than the head, straight or nearly so, compressed, and in form resembling the blade of a knife truncated, with the appearance of having been broken at the point; the upper mandible is much shorter than the lower, and has a groove into which the lower mandible is received. The beak is short and slender. The wings are very long and pointed, the first quill longest. The tail is forked. Three species are known—one from America, one from India, and one from the Nile and the Red Sea. The Common Scissor-bill, Shearwater, or Black Skimmer (*Rhynchops nigra*) is about 19 inches in length, with an expanse of wing giving a measurement of 3 feet 6 or 8 inches. It ranges along the east and west coasts of America.

Continually traversing the surface of the water, this extraordinary bird flies with the celerity of an arrow, and with the tip of the lower knife-like mandible cleaving the liquid surface it seizes its prey, namely, fishes and various crustacea. In this manner flocks of them skim to and fro, busy in skimming the waves, uttering, as they dash along, loud harsh cries of exultation. It is nocturnal in its habits. The scissor-bill breeds in small flocks in marshes, on sandbanks, and low islands; the eggs are three in number, of a clear white, spotted with different shades of ash. The general colour of this species is dark umber brown, approaching to black over the wings and upper surface; the forehead, cheeks, throat, and under parts are white; there is a slight bar of white across the wings; the feet are lead colour; the mandibles are orange-red at the base,

becoming black at the tip; the length of the lower mandible is about 5 inches. The Indian Scissor-bill (*Rhynchops albicollis*) is common throughout India, frequenting, in small flocks, the rivers, especially the larger ones.

SCITAMINÆÆ is an order of *MONOCOTYLEDONS* which includes the different kinds of Cardamom, Galangale, Ginger, Turmeric, Zedoary, &c. The rhizomes and seeds of many species possess remarkable aromatic and stimulant properties. The following are the chief characteristics of the order Scitamineæ:—The flowers are irregular; the perianth, of six parts, is in two series, the outer being generally calyx-like and the inner segments like petals; there are sometimes five fertile stamens, the sixth being small or wanting, sometimes only one perfect stamen, with five petaloid staminodes; the ovary is inferior, three-celled, or with the partitions imperfect; there is one anatropous ovule, or several at each placenta; the fruit is fleshy, indehiscent, or opening loculicidally by three valves; the seeds are often arillate; the embryo is situated in a central sac of the perisperm. There are 450 species, which are herbs, mostly perennial, natives of the warmer regions of the world.

SCIURIDÆ. See *SQUIRRELS*.

SCLAVONIA, SCLAVONIC. See *SLAVONIA*, &c.

SCLERODERMI is a division of the order of fishes *PTEROGNATHI*, containing the *FILE-FISHES* (*Balistidæ*) and the *COFFER-FISHES* (*Ostraciontidæ*). They are distinguished by their conical or pyramidal snouts, ending in a small mouth, with distinct teeth in each jaw. The skin is rough, or covered with large hard scales.

SCLEROTIC (Gr. *sklēros*, hard) is the name given to the outermost coat of the eye, that in fact which gives and maintains the elliptical shape of the eyeball, and part of which is visible in front as the "white of the eye." See *EYE*.

SCLEROTIC ACID, a weak acid obtained from ergot of rye (*Ergotia abortifaciens*), the fungus which attacks the ear of rye. It is uncrystallizable and soluble in water, and is used in medicine, particularly for hypodermic injection. In half-grain doses it excites powerful contraction of the uterus. In larger doses it is poisonous.

SCOLOPACIDÆ is an important family of birds belonging to the order *GRATULÆ*. The Scolopacidae are found almost all over the world, some being migratory and having a wide range. They are all true wading birds, inhabiting marshes and the shores of lakes, rivers, and the sea, and living on worms, insects, molluscs, the roe, and small fry of fishes. Most of the genera procure food by thrusting the bill into the soft earth or the mud of shores, and thence extract their prey. The bill is admirably adapted for such uses. It is long, very slender, and somewhat flexible; the tip is blunt and often covered with a delicate skin abundantly supplied with nerves; the upper mandible is a little longer than the lower, and usually grooved on each side. The wings are long and pointed, and the birds generally possess considerable powers of flight. The Scolopacidae include the *SNIFE* (*Scolapax*), *CURLW* (*Numenius*), *AVOCET* (*Recurvirostra*), *SANDPIPER* (*Totanus*), *GODWIT* (*Limosa*), *RUFF* (*Machetes*), *PHALAROPE* (*Phalaropus*), and *STILT* (*Himantopus*).

SCOLOPEN'DRA. See *CENTIPEDES*.

SCOLOPEN'DRIUM. See *HART'S-TONGUE FERN*.

SCOMBRIDÆ is a family of fishes belonging to the order *ACANTHOPTERYGII*. The body is oblong, scarcely compressed, either naked or covered with small scales. There are two dorsal fins; and the hinder part of the second dorsal, as well as of the anal fin, is usually broken up into a number of finlets. The ventral fins are thoracic in position, and have one spine and five rays. This family is one of the most important as regards our food supply, taking rank with the cod, herring, and salmon families. The Scombridae are active swimmers, moving generally in shoals,

and preying on other fishes and their young. They are abundant in all tropical and temperate seas. The type of the family is the Common MACKEREL (*Scomber scomber*). It also includes the genera *Thynnus* (TUNNY and BONITO), *Pelamys*, *Auxis*, *Cybridium*, *Elacate*, and *Echeneis* (REMORA).

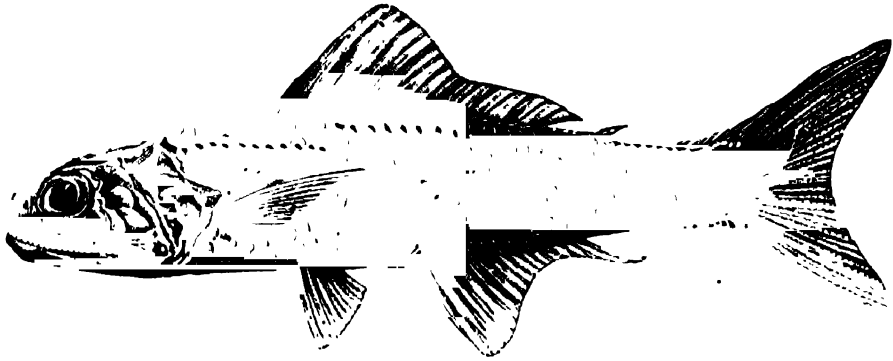
SCONE, NEW, a small town of Scotland, 2 miles from Perth. It has a public hall, parish church, and U.P. and Free churches. The population of the town in 1881 was 1483; of the parish, 2347. A little over a mile from the town is the historical spot of assembly of the Picts and the capital of their kingdom, where the famous Stone of Destiny, which Edward I. carried to England, and which is now under the coronation chair at Westminster, was kept. An abbey was founded at Scone by Alexander I. in 1114, but the abbey buildings and old palace were destroyed in 1559. A new palace was built by the Earl of Gowrie, but the present palace, the seat of the Earls of Mansfield, dates only from 1803. In the grounds is the old Scone Cross. The first Scottish king known to have been crowned here is Malcolm IV., and it was the regular place of cor-

onation until the reign of James IV. The last king to be crowned there was Charles II. in 1651.

SCOPARIN, a principle obtained from the Common Broom (*Cytisus scoparius*, natural order Leguminosæ). It is a yellow, tasteless, neutral powder, which burns with a luminous flame. It is soluble in alcohol and in boiling water. The formula is $C_{21}H_{22}O_{10}$. It is very soluble in alkaline solutions, dissolving with a yellowish-green colour. The ammoniacal solution leaves it, on evaporation, in the form of a green jelly. It is this principle to which the plant owes its diuretic properties.

SCOPAS. See SKOPAS.

SCOPELIDÆ is a family of fishes belonging to the order PHYSOSTOMI. The Scopelidæ agree with the SALMONIDÆ in having a second dorsal fin, the adipose fin, which is merely a fold of skin inclosing fat; but differ in the absence of the air bladder, in the margin of the upper jaw being formed of the premaxillary alone, and in the pyloric appendages of the intestine, when present, being few in number. In some the body is naked, but in others



Eri-lant Lamp-fish (*Scopelus resplendens*).

it is covered with scales. The Scopelidæ are confined to the sea, and most are either pelagic or deep-sea forms. In the typical genus *Scopelus* most of the species come to the surface of the sea at night, but during the day remain at great depths. *Scopelus* is remarkable for the possession of luminous organs on the sides of the body, which are supposed to phosphorescent light at depths in which the large eyes of the fish are useless. In another deep-sea form, *Bathypsetta*, discovered by the *Challenger*, some of the rays of the pectoral fins are greatly elongated, and probably serve as organs of touch. The Bombay Ducks of commerce are the salted and dried bodies of a species of Scopelidæ, *Harpodon nehereus*, a deep-sea fish which, when first captured, is brilliantly phosphorescent. *Plagiodon ferox* is the "tiger" of deep-sea fishes. It grows to a length of 6 feet, and has formidable jaws armed with teeth of various sizes, some very large and fung-like. It devours fishes of various kinds, crustaceans, &c.

SCORE, in music, is the name given to that method of writing concerted music which shows the various parts one above the other, carefully arranged so that notes simultaneously sounded in several parts are all in the same vertical line, and the whole effect of the harmony is seen at a glance. The chief varieties of score are as follows:—(1) The *Vocal Score*, the most ancient, always arranged with the more acute parts uppermost and the more grave beneath; thus—reading from the top downwards—the lines are soprano, contralto, tenor, bass; or, in male voices, first tenor, second tenor, first bass, second bass; and so similarly in other varieties of combination. We have in England (British Museum), and by English musicians, the oldest specimens of scoring extant—namely, vocal scores of about the year 1225, of about the year 1250, and so on. The next earliest is one about the year 1260 at Paris. (2) *Short Score* or *Com-*

pressed Score is vocal score or similar work in three, four, or five parts, compressed into two lines. This arrangement is familiar in hymn books, when the soprano and contralto are written together on one staff (Clef or G clef) and the tenor and bass on another staff (Bass or F clef). Short score is very quick and easy to read, and in simple works it is quite as convenient for the performer as a complete score. It saves vastly in space use. (3) *Pianoforte* or *Organ Score*. The pianoforte and organ have the same two staves as the short score, and so has music for the harp and for some other instruments of large compass and with the power of emitting simultaneous sounds more than one sound, e.g. the harmonium, concertina, dulcimer, guitar, banjo, &c. When a pianoforte or organ accompaniment is used to voices in the place of a full band, &c., the arrangement is called "Pianoforte (or Organ) Score." Pianoforte scores of all the great operas and oratorios are now familiar in every household, and are to be distinguished from pianoforte arrangements, because the former contain the voice parts in full vocal score, or occasionally, in simplified portions, in short score, for the saving of space. (4) *Orchestral Score*, which generally extends across the whole page from top to bottom, in works for the modern orchestra, as may be imagined, when Wagner uses thirty-one lines going at once, as in the third act of the "Walküre." And even then has to crowd two and even three parts into one line occasionally. No less than 40 lines would be required in this piece if every instrument had its own line. The usual arrangement in orchestral score is to put the flutes, oboes, clarionets, and bassoons (wood-wind) at the top (though, in his earlier work, Mozart began with the violins, except the basses, which of course must always be in every arrangement at the foot of the page), the violins, violas, and violoncellos, with contrabasses, &c., "double-basses"

(strings) at the bottom, and the horns, drums, &c., in between. If there are voices they come usually just above the violoncellos, and if there is an organ part it comes beneath the voices. Solo voice parts are written above chorus parts. Examples of one or two typical scores are given beneath:—

Beethoven.	Mozart.	Wagner.
Gloria—Mass II	Overture—Don Giovanni.	Walkure, Act III, Scene I.
Flutes 1, 2	Violin 1	Piccolo 1, 2,
Oboes 1, 2	" 2	Flutes 1, 2
Clarionets 1, 2	Viola	Oboes 1, 2, 3
Bassoons 1, 2	Viola	Corno Inglese
Contratragotto	Viola	Clarionets 1, 2, 3
Horns 1, 2	Viola	Bass clarinet
" 3, 4	Viola	Horns 1, 2
Trumpets 1, 2	Clarionets 1, 2	" 3, 4
Drums	Bassoon 1, 2	" 5, 6
Trombone 1	Horns 1, 2	" 7, 8
" 3	Trumpets 1, 2	Bassoons 1, 2, 3
Viola	Drums	Trumpets 1, 2
Violoncello (with Contrabasso)	Violoncello (with Contrabasso)	" 3, 4
Viola		Tromba Bassa
Soprano		Trombone 1
Contralto		" 2
Tenor		" 3
Bass		" 4
Soprano		Tuba Contrabasso
Contralto		Drums 1, 2, 3, 4
Tenor		Cymbals
Bass		Sn. Drum
Organ		Viola
Violoncello		Semibass
Contrabasso		Harp
		Viola
		Violoncello
		Contrabasso

SCORIE (Ital. *scoria*, dross) are chafery fragments of lava, found abundantly round all centres of volcanic activity. They are mostly ragged portions of the scum of lava-streams, produced by the violent escape of imprisoned gases before cooling; while others originate as small masses of the same material hurled in a molten state directly out of the crater, and shaped in their passage through the air.

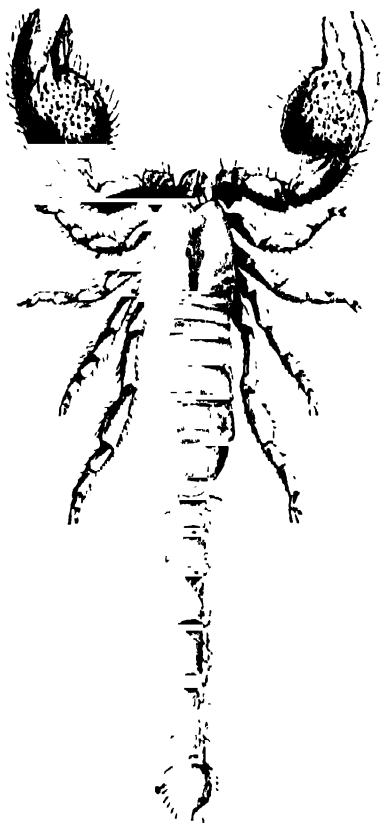
SCORPÆNIDÆ is a family of fishes belonging to the order *ACANTHOPTERYGII*. They have an oblong more or less compressed body, often scaleless, the head is usually armed with spines; there is one dorsal fin with the spinous portion well developed; the ventrals are thin, sometimes rudimentary, the dentition is feeble. The Scorpænidæ are various scurfishes, some resembling in form and habits the sea-perches, while others live on the sea-bottom and are provided with curious frond-like appendages for the purpose of concealment or attraction to their prey. Some are poisonous, and in many the spines of the head and dorsal fin inflict serious wounds. The species of the typical genus *Scorpena* are chiefly tropical. They reside mostly on rocky grounds, feeding on crustaceans and small fish. The species of the genus *Scoristes*, chiefly from temperate seas, resemble sea-perches in form. One species, the bergylt or Norway Haddock (*Scoristes norvegicus*), is occasionally taken on British coasts; it is of a dark red color generally, and about 2 feet long. In the genus *Synanceia*, from the Indo-Pacific, the spines of the dorsal fin are grooved and provided with a poison-gland, causing wounds sometimes attended with fatal results.

SCORPIO (the Scorpion), a constellation of the zodiac, lying between Libra and Sagittarius, and bounded north and south by Ophiuchus and Lupus. It contains one brilliant red star (*Antares*) of the first magnitude, which, with *Spica Virginis* and *Arcturus*, forms a conspicuous triangle. There are many other fine stars; in fact it is one of the richest constellations of the zodiac. *Antares* is very interesting as having a recently-discovered

minute green companion; for a long time the green flashes occasionally observed in its red glow were inexplicable. This constellation was formerly two signs of the Greek zodiac, the claws occupying the place of Libra. The story is that the chela or claws of the scorpion were drawn back by Roman astronomers, and the constellation Libra added in honour of Julius Cæsar, at whose death a new star was said to have appeared in that part of the heavens. This story is alluded to, not very distinctly, by Virgil; Ptolemy does not mention Libra in his catalogue, though he does elsewhere. Dupuis contends, from its presence in the most ancient Indian and Persian zodiacs, that it is in reality as ancient as the rest; and indeed it is not unlikely that the Greeks may have derived their zodiac from some nation in which the term for scales was confounded with that for claws, either by a synonym in the language itself, or by mistranslation on their part. In referring to stars in Scorpio, the genitive *scorpii* (as if from *scorpius*) is generally used instead of *scorpiionis*; thus *Antares* is called Alpha Scorpii.

The *sign* scorio, which the sun enters about 23rd October and leaves about 22nd November, corresponds roughly with the constellation Libra, the signs of the zodiac having now shifted one constellation from their old place, on account of the gradual precession of the equinoxes.

SCORPION (*Scorpidæa*) is an order of ARACHNIDA. In the article KING-CRAB, which gives an epitome of an interesting comparison, by Professor Ray Lankester, of the scorpion with the king-crab (*Limulus*), the structure of the former animal has been dealt with in some detail. Scorpions have a long segmented body, ending in a short curved



spine, with which is connected a pair of glands secreting a poisonous fluid; the poison is discharged by two small pores at the point of the spine. The cephalo-thorax bears six pairs of appendages, the basal joints of most of which

are turned in towards the mouth and act as jaws. The first pair, the chelicæ, are composed of three joints, the last two of which form small pincers. The second pair form the larger nippers or chelæ, and the remaining four pairs are walking limbs. The abdomen consists of six segments, and is indistinctly separated from the cephalothorax; and following this is a narrow six-jointed post-abdomen or tail ending in the sting. On the sides of each of the last four segments of the abdomen are two stigmata opening into a pair of lung-sacs. The second abdominal segment bears two comb-like appendages, probably tactile in function, and in the preceding segment is placed the opening of the reproductive glands. The heart consists of an elongated eight-chambered tube; there is a complete arterial and venous system; and the brain and nerve-cords are inclosed in arteries. The alimentary canal is straight and narrow, opening on the under side of the penultimate caudal segment; with it are connected large salivary glands, a large liver, and Malpighian tubes or urinary organs. The nervous system consists of a brain, a nerve-collar surrounding the œsophagus, and a ventral cord. On the upper surface of the cephalo-thorax are placed from three to six pairs of simple eyes (ocelli).

Scorpions inhabit the hot countries of both hemispheres. They live on the ground, concealing themselves under stones and other objects, most commonly in ruins, dark and cool places, in houses, and even in beds. They run with considerable swiftness, curving the tail over the back; this they can turn in every direction, and use for the purposes of attack and defence. With their forceps they seize various insects and spiders, sucking their juices after having pierced them with their sting. They are particularly fond of the eggs of spiders and insects. Scorpions produce their young alive; after birth the young are carried by the parent for several days upon her back, during which time she never leaves her retreat. The sting of some of the tropical species, which attain a length of 5 or 6 inches, is very dangerous, and sometimes fatal. Ammonia used both externally and internally is the best remedy.

The common European Scorpion (*Scorpio europæus*), common in the south of Europe, is a little brownish creature, about an inch long, with six eyes; and its sting is usually quite harmless to human beings. The Reddish Scorpion (*Androctonus occitanus*), distinguished by having eight eyes, is about 3 inches long, and its sting is more dangerous; it is found in Southern Europe and North Africa. The genus *Androctonus* also contains large formidable species from Africa, India, &c. The idea that scorpions commit suicide when surrounded by fire has been disproved. As is natural, the scorpion has been well-known from very ancient days. On Egyptian monuments it is represented as the symbol of the powers of evil. The scorpion, as is well known, is one of the signs of the zodiac. See SCORPIO.

SCORPION FLY (*Panorpa communis*) is a common British insect belonging to the family Panorpidæ and order Neuroptera. It is about half an inch long, having a long slender black body, an elongated head with thread-like antennæ, four large transparent wings spotted with dark-brown, and long yellowish legs. The name alludes to the forceps-like appendage of the abdomen in the male, which is carried in the air, and presents considerable resemblance to the sting of a scorpion; it is used as a clasping organ during the union of the sexes. The scorpion-fly is very abundant about hedge-banks, &c., especially in damp situations. It is predaceous in its habits, attacking other insects. The female deposits her eggs in damp earth in a cavity formed by the styliform appendages of the abdomen. The larvæ remain underground, feeding on decomposing vegetable substances, and forming a burrow in which they undergo the change into pupæ; the pupæ, after a short period of rest, make their way to the surface and change into perfect insects. Two broods are produced in the year.

SCORZONE'RA (Span. *escorza*, a serpent), a genus of plants of the order COMPOSITE, comprising one esculent species of great value. The Viper's Grass (*Scorzonera hispanica*) is a native of Spain, but cultivated in this country for the sake of its roots, which find a ready sale. As it grows vigorously in a good soil, and passes uninjured through the severest winter, its culture is not a matter of difficulty. The root, which resembles a carrot in shape, though smaller in size, is dark-coloured externally, but internally of a pure white. Its taste is sweet and agreeable, resembling that of the common hazel nut, and when cooked the root possesses valuable medicinal properties. It should be carefully washed, not scraped, lest the juice which embodies its essential qualities should be lost, and then boiled until quite soft in a little water, with a tolerable handful of salt. If properly done its skin, when peeled, will come off as readily as that of a well-boiled potato. It is served up to the table like asparagus, and forms a most agreeable dish. Great caution must be exercised in boiling it, as if overboiled it will lose all its excellence; when fresh from the ground a quarter of an hour is sufficient.

Scorzonera is found in bilious complaints scarcely inferior to dandelion. It increases the flow of the gastric juice and bile, and acts as a gentle aperient.

SCOT AND LOT (a part of pothol). Previous to the Reform Act of 2 Will. IV. c. 45, in many boroughs the payment of scot and lot constituted a qualification as a voter for a member of Parliament. *Scot* is a form of the Old English *scat*. The qualification consisted in the payment of the rates which are allotted to each person as the proportion to be contributed by him. The law adopted for the purpose of ascertaining the scot and lot voters of a borough is the poor-rate of the respective parishes comprised in it. This tenure was never recognised in Scotland.

SCOT, REGINALD, was born early in the sixteenth century, in which he was the most distinguished opponent of the then almost universal belief in witchcraft. He was the son of an English gentleman of family, and educated at Oxford. He took no degree there, but devoted himself to study, and occupied his hours of recreation in gardening. The fruits of this learned leisure were "A Perfect Platform of a Hop Garden," and "The Discoverie of Witchcraft" (1584). This last book was burned by the common hangman, and refuters appeared on all sides. It was abused by Meric Casaubon, Glimvil (author of the "Synopsis Scientifiæ"), and finally, by King James I. himself, who wrote his "Demonologie," as he informs us, "to reply to the damnable opinions of Wierns and Scot, the latter of whom is not ashamed in public print to deny that there can be such a thing as witchcraft." Reginald Scot died in 1599. Scot was surveyor of Romney Marsh for many years, and took part in what was for that time a great engineering enterprise, namely, the construction of Dover harbour. The best edition of Scot is that of Dr. Bl. Nicholson (London, 1886).

SCOTER (*Oidemia*) is a genus of ducks belonging to the subfamily FULIGINEÆ, or sea ducks. The scoters have a huge strong bill, with an elevated knob at the base of the upper mandible, and the tip much depressed and terminated by a large flat nail; the legs are short, and placed rather far behind; the hind toes are small, but the three front toes are very large; the wings are short and convex; the tail is very short, narrow, much rounded, &c. tapering. The scoters inhabit the open sea. They feed chiefly on bivalve shell-fish, which they take by diving. The Common Scoter (*Oidemia nigra*) is a winter visitor to Britain, being especially abundant at that season on our eastern and south-west coasts. A few breed in the north of Scotland, but the great majority leave in spring for Scandinavia, North Russia, &c. The plumage of the male

bird is a deep black; the legs and bill are also black, except the central ridge of the upper mandible, which is orange. The female is blackish-brown, paler on the under parts. The entire length is 19 inches. The flesh is oily, and has a strong fishy taste. The Velvet Scoter (*Oidemia fusca*), a less common winter visitor to Britain, may at once be distinguished by the white band on its wings. The Surf Scoter (*Oidemia perspicillata*) is a North American species, specimens of which have occasionally been taken in Britain. Its black plumage is relieved by two oval white patches on the top of the head and on the back of the neck, and by the orange-red colour of its legs.

SCOTLAND is bounded by the sea on all sides except the south, where it adjoins England. Its greatest length is from Cape Wrath, in Sutherland, to the Mull of Galloway, in Wigtownshire, a distance of about 274 miles; its breadth varies from 147 to 30 miles. The area of Scotland contains 30,902 square miles, of which 631 are water. The outline on the sea-coast is very irregular, and the Firths of Forth, Tay, and Clyde, and other arms of the sea, penetrate to a great depth, both on its eastern and western sides. A considerable part of the surface of the country is rugged and mountainous, but there are extensive tracts of level and fertile ground along the banks of the principal rivers, especially in the counties of Berwick, Roxburgh, Ayr, Lanark, the Lothians, Stirling, Fife, Perth, Forfar, Moray, and Aberdeen.

Climate.—The climate of Scotland, as compared with the greater part of England, is extremely variable, and is cold, cloudy, and humid, though there is little difference in this respect between the southern parts of the former and the northern districts of the latter. The mean annual temperature of Scotland is about 47° Fahr. in places near the level of the sea. The average fall of rain is about 35 inches, but it varies widely in different districts, there being only 100 dry days on the west coast, while there are 230 on the east. The climate is on the whole very salubrious, and it is affirmed that the mean duration of life is greater in Scotland than in most countries.

Mountains, Rivers, and Lakes.—The interior of the country is commonly stated to consist of two distinct regions—the Highlands, generally in the north and west; and the Lowlands, in the south and east. The line of division between them is marked by a valley or plain, which extends across the entire island from north-east to south-west, or from the foot of the Grampians, where the range touches the shore of the North Sea, to the Clyde estuary, varying in width, and subject to hilly interruptions in its more southerly portions. This dividing-line is known in popular parlance of its course as Strathmore, the "great strath" or valley. The distinction of the surface into high level or lowland regions is of old historical date and true to nature, but for descriptive purposes, it is more correct to consider Scotland as distributed into three great regions well marked by nature—southern, middle,

Southern Scotland comprises the country extending from the main watershed between the Clyde and the Forth to the Irish Sea, and to the English border. It contains various tracts of fertile level or low surface, cultivated with the English plough, and is also to some extent a hilly region, studded with isolated elevations, and traversed by continuous ranges, to which the name of the Southern Highlands is often applied. These ranges are distinguished generally by rounded or flat summits, gradual slopes, and a grassy clothing, features wholly distinct from the naked, precipitous, and frequently savage aspect of the Highlands proper. Towards the centre of the district rise the Lothian Hills, from which branches run north into Peeblesshire and Selkirkshire, and south through Dumfriesshire and Lanarkshire. To the north and north-east, the Cheviots,

forming in part the boundary between Scotland and England. The dales that lie between these ranges have their names from the streams flowing through them, as Tweeddale, Clydesdale, Nithsdale, and Annandale. They are celebrated in pastoral life and border song. The highest points are around the head waters of the Tweed and the Clyde, where Queensberry Hill rises 2260 feet; Tinto Hill, 2316; Hart Fell, 2636; and Broadlaw, the loftiest summit, 2761 feet above the sea.

Middle Scotland, the main mass of the country, extends from the preceding district to Glenmore, or the "great glen," which stretches diagonally across the island from Fort-William to Inverness, and is occupied by several lakes connected together by the Caledonian Canal, forming with it a bond of union between the Atlantic and the North Sea. In this region, the Sidlaw and Ochil Hills, ranges of moderate elevation, form the southern boundary of Strathmore; while on its northern and western sides tower the majestic Grampians, apparently an impassable barrier, in the recesses of which the old Caledonians found a secure asylum from the Roman legions. Formations of the Old Red Sandstone and Carboniferous series occupy the south and east, while the mountains in the opposite directions are composed chiefly of crystalline schists, with granite in the higher parts.

The Central Grampians, the highest elevations in the United Kingdom, stretch east and west from shore to shore, a length of nearly 100 miles, and have a breadth varying from 12 to 25 miles, with an average height of from 2000 to 3000 feet. But many summits attain a much greater altitude. At the western extremity, Ben Nevis, the culminating point of the Britannie system, rises to 4106 feet above the sea.

Northern Scotland includes the remainder of the country up to the Pentland Frith, and is a region of high moorlands—wild, barren, and desolate—covered with heath and bog, the platform of mountain ranges, with some extent of productive soil on the eastern shores. The great general elevation of the surface detracts from the apparent height of the summits, but Ben Wyvis, near Dingwall, attains 3122 feet, and Ben Attow 4000, on the borders of Ross and Inverness. In the two northern counties, the surface lowers from west to east, and the greater part of Caithness is a plain, largely clothed with stunted heath, properly belonging to the Scottish lowlands.

The highest cultivated land in Scotland is in the neighbourhood of the village of Leadhills, in Lanarkshire, 1564 feet above the level of the sea; but, with a few exceptions, an elevation of 600 feet is the limit of the tillage lands in Scotland.

The principal rivers in Scotland, with the single exception of the Clyde, are on the east coast. The Tweed rises in the high table-land called Tweedsmuir, about 6 miles from Moffat, and after a winding course of about 100 miles, falls into the German Ocean at Berwick-upon-Tweed. Its principal tributaries are the far-famed Eddrick, Gala, Leader, and Teviot, the Till and the Whitadder. During the latter part of its course it forms the boundary between England and Scotland. The Forth rises on the east of Benlomond, and runs in an easterly direction, receiving the waters of the Teith and the Allan, till it terminates in the Frith of Forth at Alloa, draining in its course 793 square miles. The Tay, which rises in the western extremity of Perthshire, conveys to the sea a larger quantity of water than any other river in Scotland. It does not receive the name of Tay till it leaves the romantic sheet of water called Loch Tay. Augmented in its course by the Lyon, Tummel, Isla, Almond, Earn, and other streams, it passes Dunkeld, Perth, and Newburgh, where it assumes the appearance of a fifth or estuary. It is navigable at Dundee, which is situated on the estuary, for vessels of the largest size, and as far as Perth for small vessels. The North and South Esk

have their source in the Grampians, and fall into the sea at Montrose. The Dee and the Don have also their rise in that range, and pour their waters into the sea at Aberdeen. The Spey, the most rapid of Scottish rivers, flows from Loch Spey in a north-easterly direction, and falls into the Moray Frith. It drains 1234 square miles. The Ness, which has its source in Loch Ness, and the Findhorn, which rises in the Monagh Lea Mountains, also flow in a north-easterly direction, and fall into the Moray Frith. The Clyde, which in a manufacturing and commercial point of view is the most important river in Scotland, rises on the west of the Moffat Hills, and widens into the Frith of Clyde at Dumbarton. It passes a number of important commercial towns, draining 945 square miles, and is navigable for large vessels as far as Glasgow.

The fresh-water lakes in Scotland occupy an area of 631 square miles, an aggregate extent of 403,840 English statute acres. The most important of these lakes are—Loch Lomond, 22 miles in length, lying between Dumbar-tonshire and Stirlingshire; Loch Ness, in Inverness-shire; Loch Marce, in Ross-shire; Loch Awe, in Argyleshire; Lochs Tay, Rannoch, Ericht, Earn, and Katrine, in Perthshire. About two-thirds of the Caledonian Canal—which stretches from the neighbourhood of Inverness to Fort-William, a distance of 60 miles—are formed by the three lochs, Ness, Oich, and Lochy.

Geology.—Scotland may be separated geologically into three portions. A line drawn from Stonelaven in Kincardineshire to the Mull of Cantire will mark the southern boundary of the primary non-fossiliferous system of rocks, composed chiefly of gneiss, mica-slate, chlorite-slate, and clay slate. In this district very few metallic ores have been found. It contains four basaltic islands, of which the most celebrated is Staffa. A second line, drawn from St. Abb's Head in Berwickshire to Girvan on the Ayrshire coast, passing near Peebles, Sanguhar, and New Cumnock, forms the northern boundary of the old graywacke or Cambrian rocks, which are also destitute of organic remains. Between these two lines lies the great central basin of Scotland, which comprehends the Old Red Sandstone. This rock stretches across the whole country from the German Ocean to the Atlantic, forming a long uninterrupted, extensive, and fertile valley. The most important group in this district is the coal formation, consisting of limestone, ironstone, freestone, coal, and clays. It abounds with large numbers of organic remains. The great coal-field of Scotland extends with little interruption from the eastern to the western coast. The most valuable part of this field is situated on the north and south sides of the Forth and of the Clyde, but detached coal-fields have also been found in various other parts of the country. Iron abounds in many parts, particularly in the coal-field. Lead mines are worked to a large extent at Leadhills and Wanlockhead, in Dumfriesshire. Copper ore, antimony, and manganese are also found in various districts. There are slate quarries in the counties of Aberdeen, Argyle, Perth, and Peebles, and marble is found in Argyleshire, Sutherland, and the Hebrides.

Communications, Resources, &c.—The turnpike roads in Scotland are superior to those in England. They are of modern formation, for until after the middle of last century there was scarcely a good road in Scotland. The railway system is now extended to almost every district of Scotland, but the canals are still in active operation. The Caledonian Canal, the greatest work of the kind in Great Britain, extends from a point near Inverness through the "Great Glen" to Fort-William, a distance of 60½ miles, of which 23 miles are artificial. The Crinan Canal, which is 9 miles long, affords a communication between Loch Gilp and the Atlantic. The Forth and Clyde Canal stretches from Grangemouth, on the Forth, to Bowling Bay, on the Clyde, a distance of 35 miles. The Union Canal commences at

Edinburgh and terminates near Falkirk, where it joins the Forth and Clyde Canal, a distance of 31½ miles. The Monkland Canal stretches from Glasgow to Woodhall, near Airdrie, a distance of 12 miles. The Aberdeenshire Canal connects Inverury with the harbour of Aberdeen, a distance of 18½ miles.

Owing to the rugged and mountainous character of Scotland, only a comparatively small portion of the surface can be devoted to arable husbandry, chiefly in Berwickshire and the Lothians, Perthshire and Forfarshire, which contain the rich alluvial cause or plain of Gowrie, and the fertile valleys of Strathmore and Strathearn. In no part of the country north of the Frith of Forth is the climate favourable to the growth of wheat, being subject to long intervals of bleak weather. It will not ripen except at the level of the sea in the latitude of Aberdeen; and the Dornoch Frith marks the northern limit of its growth under the most advantageous circumstances. Hence, barley and oats, the hardiest of the cereals, are the principal crops. Pastoral industry is extensively pursued in the upland districts.

Scotland has long been famous for its fisheries, especially for those of salmon, which yield a large annual revenue. The herring fishery is also carried on to a very large extent, mainly of late years on the north-east coast and that of the islands of Orkney and Shetland.

The manufactures of Scotland are extensive and flourishing. The principal seats of the cotton manufacture are in the counties of Lanark (which includes the city of Glasgow) and Renfrew. Dundee is the centre of the jute and linen manufacture, which is also carried on at Dunfermline, Kilmarnock, Arbroath, Montrose, &c. Woollen manufactures prevail at Galashiels, Hawick, Jedburgh, Paisley, Kilmarnock, Bannockburn, and Tillicoultry. Shipbuilding and the making of steam-engines and every other description of machinery, are the staple industries on the banks of the Clyde. Vast quantities of cast-iron goods are produced at Carron, Shotts, and many other works, while the demand for steel for shipbuilding purposes has led to the erection of several important steel works near Glasgow. There are upwards of sixty-five paper mills in Scotland.

Whisky is the favourite drink of the people of Scotland. The quantity made annually is about 20,000,000 gallons, of which 7,000,000 gallons are retained for home consumption. Formerly the quantity made use of was enormous (in 1857 amounting to 13,299,409 gallons), but of late years, under the combined operation of high duties, more stringent legal restrictions, and the diffusion of temperance principles, the quantity of spirits consumed in Scotland has been considerably diminished.

The population of Scotland at the period of the Union is supposed not to have exceeded 1,050,000. In 1801 it amounted to 1,608,420; in 1851 to 2,888,712; in 1861 to 3,062,291. By the census of 1881 it was 3,735,573.

Parliamentary Representation.—Scotland is divided into thirty-four counties, all of which are described in separate articles, and which under the Redistribution of Seats Act of 1885 return thirty-nine members to the House of Commons. In addition there are seven cities and towns returning eighteen members, and thirteen groups of burghs returning one member each; two members are returned for the four universities, which are voted in pairs for that purpose. Before 1868 Scotland had only fifty-three members; it now has seventy-two. The Scottish peers are represented in the House of Lords by sixteen of their number, elected by the whole of the peers, who hold their seats not for life, like the Irish peers, but for only one Parliament. The necessity for Scotland possessing a special representative in the ministry had long been felt, but it was not until 1885 that an Act was passed providing for the appointment of a secretary for Scotland at a salary of £2000 per annum.

Religion.—The established and prevalent form of religion in Scotland is the Presbyterian. There is in each parish a parochial tribunal, called a kirk session, consisting of the minister (or preaching elder), who acts as president or moderator, and of a greater or smaller number of persons ordained as ruling elders (presbyters), whose principal duty is to assist the minister in certain functions. There are in all eighty-four presbyteries, which again are grouped in sixteen synods meeting half-yearly, and which can be appealed to against the decisions of the presbyteries. The supreme court of the Scottish Church is the General Assembly, which consists partly of clerical and partly of lay members, chosen by the different presbyteries, burghs, and universities, comprising 386 members; it meets annually in May (under the joint presidency of a lord high commissioner appointed by the crown, and a moderator appointed by the Assembly), sitting for ten days, the matters not decided during this period being left to a commission.

The total number of parishes, old and new, is 1307, and the total number of churches, chapels, and stations 1887; the total number of clergy, with and without charges, is about 1700. The parishioners are allowed, under certain restrictions, to choose their own minister. The entire endowment of the Church of Scotland from all sources, including the annual value of the manors and glebes, amounts to about £550,000 per annum. Besides this, some 1815 members of the church have erected and endowed churches, the value of which, with endowments, is said to amount to considerably more than £2,000,000. The voluntary contributions amount to about £300,000 annually, and payments to £62,355. The Established Church, in 1889, had 564,118 members or communicants. See ESTABLISHED CHURCH OF SCOTLAND.

The Presbyterian dissenters from the Church of Scotland have the same ecclesiastical organization as the parent church. Of these dissenters, the largest body is the Free Church, formed from a secession in 1843, with (in 1886) 1195 ministers, 1100 churches, 325,000 members, and 40,000 members and adherents 945,000 of the population. Its income in 1886 was £594,050. Next is the UNITED PRESBYTERIAN Church, formed from the amalgamation of several bodies of seceders (one dating as far back as 1733), with 556 ministers, 557 churches, 182,812 members, and an income in 1885 of £324,819. There are also Baptists, Independents, Methodists, and Unitarians. The Roman Catholics have increased largely of late years, chiefly from the influx of Irish population. In 1880 the Episcopal Church in Scotland, which includes a large portion of the nobility and gentry, had 7 bishops, 229 churches, and 250 clergy, and claimed the adherence of about 75,000 of the population.

The Protestant faith was established in Scotland in 1560. On the 1st August of that year a Convention Parliament dissolved the Roman Catholic Church, and on 20th December of the same year the first Presbyterian General Assembly was held in Edinburgh. In 1561 the "First Book of Discipline" was compiled. The fundamental principles of the reformed church were ratified by the legislature in 1567 and the Presbyterian polity was established by the Act of 1592, entitled "Ratification of the Liberate of the Free Kirk of Genevral and Synodical Assemblies of Presbyteries, of Discipline." After a long and severe struggle Episcopacy was introduced, through the influence of James VI., by the Parliament of 1612. In 1637 the attempt to force upon the Scottish people the famous liturgy compiled by Laud and West, excited the convulsions which ended in the Civil War, the overthrow of the monarchy, and the re-establishment of Presbytery. On the restoration of Charles II. all the Acts of the Commonwealth were rescinded; the episcopal form of government was restored, and it was enacted that all

ministers who would not submit to be ordained anew by a bishop should be deprived of their benefices. Three hundred and fifty of the clergy were driven from their parishes, rather than do violence to their consciences by yielding compliance with this tyrannical enactment. The great body of the people forsook their parish churches and adhered to the ejected ministers. This led to the enactment, in 1664, of the bill called the Conventicle Act, which forbade nonconformists, under severe penalties, to frequent any conventicles or places of worship not belonging to the Establishment. This Act was enforced with great rigour by Sir James Turner, General Dalziel, Graham of Claverhouse, and others, and led to frequent insurrections, which were suppressed with savage cruelty. Numbers of the ministers and other leaders of the Covenanters were executed with circumstances of revolting barbarity, and great numbers were imprisoned or transported to the plantations. The expulsion of James VII. from the throne by the Revolution of 1688 put an end to this merciless persecution, and the episcopal form of church government was abolished, and Presbyterianism once more established by the Convention Parliament in 1689. Ten years later lay patronage was abolished by an Act of the Scottish Parliament, but it was restored in 1712 by the British Parliament. It is to this measure that, directly or indirectly, may be traced the dissensions which repeatedly distracted the Established Church of Scotland. The Patronage Abolition Act of 1874 finally removed this long-standing source of bitterness.

Education, Law, &c.—Scotland has long been celebrated for its system of national education, which engaged the attention of the Scottish Parliament as early as the year 1194. The illustrious reformer, John Knox, proposed that a school should be established in every parish, a college or grammar-school in every town, and a university in every city; but the rapacity of the barons and the unsettled condition of the country prevented the execution of this noble scheme till after the Revolution. In 1696 the famous Act was passed which declared that there should be a school instituted and a schoolmaster appointed in every parish.

This system, together with the grammar-schools established in every burgh under municipal management, undoubtedly did a glorious work for Scotland; but the provision made by them, even when supplemented by numerous private schools, proved insufficient for the increasing population, and in 1872 an Education Act was passed for Scotland. This Act established a central Board of Education, now replaced by the Scottish Education Department in London, and a system of school-boards—one in every parish and burgh throughout Scotland. The Act of 1696 was repealed, and all the schools under it transferred to the new boards. The very high standard of education in Scotland was no less remarkable than its universality; and consequently, when in 1873 the Scottish Board of Education arranged the code under which the parliamentary grants were to be distributed, several special provisions were necessary to meet the case of the numerous extra-efficient schools. The regular capitation grant was fixed lower than in England; but extra grants were made for superior organization and discipline, and for proficiency in various specific subjects, such as mathematics, English literature, Latin, Greek, German, mechanics, chemistry, animal physiology, physics, singing, &c. The number of children under instruction averages about 550,000, of whom about 150,000 are in schools under government inspection. See also EDUCATION.

Scotland has four universities—St. Andrew's, founded in 1413, on the model of Paris and Bologna, by Henry Wardlaw, bishop of that see; Glasgow, established in 1450 by Pope Nicholas V., at the solicitation of William

Turnbull, bishop of Glasgow; Aberdeen, founded in 1494 by a bull of Pope Alexander VI., obtained by James IV. at the instance of Bishop Elphinstone; and Edinburgh, founded in 1582 by James VI.

The supreme court in civil matters is the Court of Session, consisting of thirteen judges, who are styled Lords of Session. They sit in two courts, called the "Inner" and the "Outer" house, and form, in effect, two courts of equal and independent authority. The supreme criminal court, called the Court of Justiciary, is composed of six judges, who are also judges of the Court of Session. The president of the whole court is the lord justice-general. The duties of the Court of Exchequer, for the trial of cases connected with the revenue, are devolved on two of the judges of the Court of Session. There are also inferior courts of law, viz. the courts of the sheriffs, justices of the peace and burghs, all of which have jurisdiction, within certain defined limits, both in civil and criminal affairs.

HISTORY OF SCOTLAND.—Like all other lands of Europe Scotland has her **STONE AGE** and her **BRONZE AGE**, followed by the beginnings of civilization in her iron age. The consideration of these prehistoric ages scarcely falls within the limits of this article, nor do they differ in any essential particular from the similar periods of other lands. A reference to the articles indicated will suffice for this place. Those who wish to study the specially Scottish aspect of the subject will find it most exhaustively and interestingly treated in the learned work of Dr. Joseph Anderson, "Scotland in Pagan Times: the Bronze and Stone Ages" (Edinburgh, 1886), a volume completing a series on the prehistoric survey of Scotland from the early Christian remains backwards. Our first authentic historical knowledge of Scotland is derived from the Romans, who called the country *Caledonia*. They fought many sanguinary battles with the fierce and barbarous tribes which inhabited the northern parts of Britain, penetrated as far as the Moray Firth, but made no permanent settlements beyond the Firth of Forth. They finally abandoned the country in 410. The native Celtic tribes at this period, termed Picts or Pieti, were a warlike and untamable, nearly savage, race, who led a pastoral life and practised polygamy and idolatry. They were rather akin to the Gaelic (Irish) than the Cymric (Welsh) branch of the Celts. The country between the Forth and the Solway, called *Valentia* by the Romans, was inhabited by tribes which, through intercourse with the invaders, had made some progress in civilization, but had become unwarlike and effeminate. After the abandonment of Britain by the Romans, these tribes were compelled by the constant attacks of the Picts to unite in their own defence, and from this union arose the kingdom of Strathclyde, of which Dun Briton, now Dumbarton, was the capital, and which extended so far southward as to include the present Cumberland.

About this period (449) a new people, the English, of Gothic origin, invaded and ultimately effected a settlement in the south-eastern districts of Scotland. A century later, Ida, one of their chiefs, extended his rule as far as the Forth; and another of them, named Edwin, in the beginning of the seventh century, founded Edinburgh or Edwin's burgh, the present capital of Scotland.

Meanwhile the Scots, a Celtic race which emigrated from the North of Ireland, had made occasional incursions into the Roman provinces in Britain as early as the year 360. In the beginning of the sixth century they effected a settlement in the peninsula of Cantire under three chiefs, named Lorn, Fergus, and Angus; but for three centuries the annals of the Scoto-Irish kings who reigned in this district are involved in almost impenetrable obscurity. One great event alone shines out brightly amidst the surrounding gloom—the conversion to Christianity of the various races who inhabited the northern provinces of Britain.

Towards the close of the fourth century Ninian, the son of a British prince of Cumberland, visited Rome, where he was ordained and sent to preach the gospel to the pagan tribes of Caledonia. He established the chief seat of his mission at Whithorn in Galloway, where he erected "a church of stone," which was for ages regarded with peculiar veneration. About the middle of the sixth century St. Kentigern (St. Mungo) imparted the knowledge of Christianity to the Strathclyde Britons. The conversion of the northern Picts, which took place about the same period, was effected by the labours of the famous St. Columba, an Irish Scot of royal descent, who in the year 568 founded a monastery on Iona, which ultimately became one of the chief seats of learning in Europe, and the nursery of upwards of 300 churches, which Columba himself established. The indefatigable zeal of his disciples induced them to carry the knowledge of the Christian faith to the Anglian inhabitants of Northumbria, and even to undertake voyages to the northern islands and the Norwegian seas for the purpose of propagating the gospel in those far distant regions.

First or Celtic Period.—During this obscure period the Picts disappeared from history as a distinct people, and became incorporated with the Scots under one king. A fierce and protracted struggle had long been carried on between the two nations, but at length Aethanas, or Icha, king of the Scots, who died in the year 826, married a Pictish princess named Ungusha, the sister of Constantine and Ungus, princes who reigned in succession over the Picts from 791 to 830. This alliance enabled his grandson Kenneth Macdopin to claim, and after an arduous contest of three years, to acquire the Pictish sceptre as the heir of his grandmother, and thus to unite the two crowns in his own person. The Picts continued to be mentioned as a distinct people down to the tenth century, but they were ultimately absorbed by the predominating nationality of the Scots, who were a people of the same origin, speaking a similar language, and differing little in their manners, customs, and institutions.

Kenneth was an able and warlike prince, and vigorously and successfully repelled the aggressions of the English and Danes on the one hand, and of the Strathclyde Britons on the other, on his newly acquired territories. Usurpations, internal wars, and invasions of the Norsemen were of frequent occurrence; but it would be difficult and needless here to trace minutely and accurately the order of events during this dark and sanguinary period. Two things need careful note: first, the permanent occupation of the Orkneys and the Hebrides by the Norwegian invaders; and secondly, the commendation of Scotland by Constantine, Kenneth's grandson, to Edward the Elder in 924, when he chose Edward "to father and lord." On this commendation large claims to absolute feudal homage were afterwards based, very unjustly, by English kings. The ancient British kingdom of Strathclyde was conquered by Edmund, king of England, and granted as a fief in 950 to Malcolm I., king of Scotland, who did homage for that; and Lothian, including Berwickshire and the lower part of Fife, hitherto a province of England, was ceded to Malcolm II., grandson of Malcolm I., also as a fief, in 1016. Malcolm was succeeded in 1033 by his daughter's son, "the great Duncan" immortalized by Shakespeare. He was assassinated in 1039 at Bothgowan, near Elgin, by Macbeth, who had deadly injuries to avenge on the reigning monarch, and whose wife's title to the throne was better than that of Duncan. The historical Duncan was quite a young man at the time of his assassination. Macbeth held the sceptre for seventeen years with a vigorous grasp, and to the general satisfaction of his people, until he was defeated and slain in 1057 by Macduff, the mormaer (or semi-independent ruler) of Fife, with the assistance of Siward, earl of Northumberland. His adherents set up as king Lulach, the son of Lady Macbeth by her first husband, but after a brief

struggle he too was defeated and killed in 1057, and Malcolm, surnamed Canmore, the eldest son of Duncan, ascended the throne.

Shortly after this the invasion and conquest of England by the Normans took place (1066), and Edgar the English Ætheling, the heir of the English line of kings, and his sisters, Margaret and Christina, took refuge in Scotland. Malcolm espoused the Princess Margaret, who was beautiful, accomplished, and pious, and this event ultimately led to the most important changes in the manners and customs of the Scottish people. In the first instance it was followed by an inroad into England in conjunction with the Danes and the Northumbrian barons who were hostile to William the Conqueror; and William in retaliation invaded the Scottish territories both by sea and land, in 1072, and wasted the country as far as the Tay. Peace was soon after concluded between the two monarchs, but hostilities subsequently broke out at intervals between Malcolm and William, and his successor William Rufus, and the Scottish king ultimately lost his life while besieging Alnwick Castle in 1093.

The reign of Malcolm Canmore forms an important epoch in the history of Scotland. Conscious of the inferiority of his Celtic subjects, he held out inducements to strangers, whether Normans, Danes, or Saxons, to settle in his dominions, and laboured to introduce their usages among his own people. Large numbers of English took advantage of this to escape from the severe rule of the Norman conqueror. His pious and amiable queen had great influence over him. To her he committed the management of the religious affairs of his kingdom, and she corrected with a firm yet temperate hand various abuses which had crept into the church.

The innovations which Malcolm had introduced gave great offence to a powerful party among his nobles, and his brother, Donald Bann, who succeeded him on the throne in accordance with the old Celtic law of succession, issued a sentence of banishment against all the foreigners who had taken refuge at the Scottish court, and made every effort to overturn the measures which his brother had taken for the civilization of the country. But after a short and troubled reign he was expelled from the throne, and died in 1097. With him terminated the line of the Scots-Irish kings, and the strictly Scottish period of the national history of the country.

Second Period—Up to this period the predominant people in Scotland were a Celtic race. The laws, the government, the titles of honour, the usages and manners, the church, and the language were all Celtic. But the immigration of Saxon and Norman and Flemish colonists of all classes into the country, which began under Malcolm Canmore and continued during the succeeding reigns, led to the introduction of new laws, institutions, and forms of government, and produced a great revolution in the manners and customs of its ancient Celtic inhabitants. The policy which had been inaugurated by Malcolm was steadily carried out by his sons Edgar, Alexander, and David, who successively held the throne, and who were children of an English mother and had all been much in England.

The founders of the great baronid families of Scotland settled in the country at this period, and received a cordial welcome and munificent grants of land from King David, whose marriage to an English countess and long residence in England had made him extremely partial to the institutions, manners, and customs of that country. The civilization of Scotland advanced rapidly under the sway of this wise and just monarch, who applied himself assiduously to the improvement of his kingdom by the encouragement of agriculture and manufactures, the establishment of towns, the erection of churches, monasteries, and other public buildings, and the enactment of judicious and equitable laws. In fact most of the later social and political institutions were referred, rightly or wrongly, to him. His

life, by Æthelred, the abbot of Rievaulx, his faithful friend and admirer, presents a very attractive picture. Six bishoprics—Dunblane, Brechin, Aberdeen, Ross, Caithness, and Glasgow—were founded or restored by him, and the large and long existing body of irregular clergy called *Cul-dees* (from Lat. *cultus*, worship, and *Deus*, God) were induced to conform to church discipline in their monasteries.

In foreign (that is, English) politics David was not so successful. He had sworn fealty to his niece, the "Empress Maud," daughter of his sister Matilda and King Henry I., for his English fiefs; therefore he loyally took arms against Stephen the usurper of the English crown, and occupied all the north of England, save Bamborough Castle alone, in Matilda's name. Stephen hurried north and made peace; but as David felt it dishonourable to swear homage to him, the difficulty was got over by investing David's son Henry with the Honour of Huntingdon, one of the royal Scottish fiefs in England, and also the towns of Carlisle and Doncaster. The Scots claimed also the earldom of Northumberland, of which King David's wife had become legally the heiress, and Stephen promised to investigate the claim. Prince Henry therefore went to London with Stephen, and was always given precedence next the king, who seems to have liked him well. The proud English barons, who looked down upon the poorer Northern prince as a provincial, deserted the court with studied insult. David, in high indignation, recalled his son, broke off all negotiations, demanded instant possession of Northumberland, and upon evasion of his demand invaded England in 1138 and ravaged the land, the troops committing many excesses which the angry king did not trouble himself greatly to check. So serious an error seems strange in so wise a king, and it met with deserved punishment. The northern barons of England suspected that David, who stood so near the English crown in blood in the ancient English line (as his mother was Edgar the Ætheling's sister), had designs upon the throne, possibly with Stephen's connivance, and they joined together, on their own responsibility, without any command or assistance from Stephen, assembled an army, and met the Scots forces at Northallerton. King David had but a motley array with which to withstand the Norman-English chivalry. A few Norman and English knights he had, but the rest were half-savage Picts and Scots, Britons from Strathclyde, Norsemen from the Orkneys, and English settlers from the Lothians. These bodies all clamoured for precedence, and the Celts being the more numerous obtained it. The result was to be foreseen; David sustained a complete defeat. As the English army rallied round a remarkable Standard, made of the consecrated wafer of the Mass hoisted on a tall mast, with the banners of St. Peter of York, St. John of Beverley, and St. Wilfrith of Ripon floating round it, this important battle, which actually decided the fate of the north of England, is usually called the *Battle of the Standard* (1138). It is very curious to note that two friends of David, Norman barons who held lands under him, sought to induce him to give terms before the battle began; and when he refused to do so they forswore their allegiance to him, and rode over to the English host. These two Norman barons were Robert de Brus and Bernard de Bailleul; and their descendants, as Bruce and Balliol, played a great part in Scottish history nearly two centuries later. David was not driven from England, though so badly worsted at Northallerton; and eventually Stephen found it necessary to give Henry the coveted Northumbrian earldom, so that David made peace and administered all the north of England, till his death, as vassal of the English crown. It was at David's court at Carlisle that Henry of Anjou (afterwards Henry II.) was knighted.

David was succeeded in 1153 by his grandson Malcolm IV., a youth only in his twelfth year, whose troubled reign terminated in 1165. The rights over the English northern

counties, so recently acquired by Scotland, Malcolm was forced to surrender by the new King of England, Henry II. His brother, William the Lion, held the sceptre for forty-nine years, from 1165 to 1214, the longest reign in Scottish history. It is chiefly memorable for his surrender of the independence of his crown to Henry II., as the price of his liberty when he had fallen into the hands of the English in 1174, and its recovery in 1189 on payment of a large sum of money (10,000 marks) to Richard Cœur de Lion. In 1176 the Archbishop of York thought to take advantage of the spiritual needs of Scotland, and claimed episcopal sovereignty over it. But the Scots stoutly resisted this claim, and appealed to the Pope. In the end Pope Clement III., in 1188, confirmed the independence of the Scottish church and its immediate connection with the holy see. For more than a century after this date, with the exception of an inroad in the reign of King John, there occurred no national quarrel between England and Scotland, and the latter, under the rule of Alexander II. and III., enjoyed great prosperity. Alexander III. married Margaret, daughter of Henry III. of England.

In the reign of Alexander III. occurred the last of the terrible invasions of the Northmen. The Danes had in past times (till the Norman rule had become too strong for them) harassed England; but it was their kinsmen, the Norwegians, who, to a far greater degree and for a longer period, plundered Scotland, though they never possessed it, as the Danes under Cnut and his sons had possessed England. They held, however, the Orkneys, Shetlands, and Hebrides, and other islands and coast land on the west. In 1262 Hakon of Norway came to visit his Scottish domains and to make raids on the neighbouring Scottish territories. As a proof of sovereignty he had his ships dragged across from Loch Long to Loch Lomond on his road to Larry the Lennox. He then sailed up the Clyde and demanded Alexander's acknowledgment of his lordship of the isles, including the Cumbræes, Bute, Arran, &c. Alexander wisely delayed, hoping for autumn storms. These broke out fiercely, and under cover of the disorganization in the enemy's fleet that ensued, the Scots army fell upon the Norse forces and utterly defeated them at Largs, on the coast of Ayr (October, 1263). Hakon retired homewards, but died in the Orkneys, and his successor gave up Man and the Western Isles to Scotland for 1000 marks down and 100 marks yearly tribute (1266). The countries now became friendly, and Alexander's daughter Margaret was married, in 1281, to the crown prince of Norway. She died in 1283, and as the Scottish king's only son, her brother, died almost at the same time, her infant daughter, the Maid of Norway, became heir to the Scottish and Norwegian crowns.

The second period of Scottish history was now drawing to a close. The first, the Celtic period, closed with the dethronement of Donald Bain two centuries before. The second was largely a period of English influence, and the laws and customs of the greater and more civilized country had changed the face of Scotland, to its infinite advantage. Never until almost our own day did England afterwards exert so beneficial an influence over her northern neighbour. The Celtic irresponsible *mormaers* had given place to royal sheriffs; feudalism, now rightly enough looked on as an evil, was then regarded as an unmixed blessing, and had taken firm root, except among the wild tribes of the Highlands; producing order, though a stern and sometimes cruel order, out of chaos. The country grew, Argyll and the Isles were added to it; roads and bridges were everywhere constructed, and trade advanced by bounds. Berwick, the richest town in Scotland, lying on the Border or English frontier, is said by a contemporary writer to have rivalled London at that time. Inverness was renowned for ship-building, and one of its ships called forth the envy and wonder of the nobles of France, as is recorded. This fair

prospect, however, was suddenly overcast by the death of Alexander III., who was killed by a fall from his horse in 1286, perhaps the greatest national calamity that has ever befallen the kingdom; and the death of his granddaughter, the Maid of Norway, in 1290, opened the way to all the evils of a disputed succession, and threatened to plunge the country into the miseries of civil war.

Third Period—The Struggle for Independence—The Maid of Norway was the last descendant of William the Lion; therefore the heir to the Scottish throne had to be sought among the descendants of the brother of William the Lion, namely David, earl of Huntingdon. The earl's three daughters were all represented among the claimants: Margaret the eldest, by her grandson, John Balliol; Isabella, by her son, Robert Bruce; and Ada, by her son, John Hastings; and there were a host of others. The real contest lay between Balliol and Bruce, the latter claiming precedence as the nearer in degree to the common ancestor, though his mother was a younger sister of Balliol's grandmother. Bruce was supported by James, the hereditary Steward of Scotland, and by so many nobles that it was feared he would seize the crown by force. The regents therefore, and the great mass of the barons, referred the matter to the English king, Edward I., to whom the kingdom stood "commended," and who was actually overlord of Lothian and other fiefs held by Scottish kings. Further than this, all the chief claimants were of Norman descent, barons holding under Edward. Bruce's ancestor (*de Bruce*) came over with William the Conqueror from the district of the Cotentin, and received from William certain manors in Yorkshire, to which the good King David had added Annandale. The same king had granted the Balliols (*de Balliol*) a Scottish manor in Berwick.

Edward I., often called Edward the Great, was one of the foremost princes of his time—brave, skilful, and in the main just. His decision was clear and quite indisputable. Balliol held as descendant of the elder daughter, and held moreover the whole inheritance by Edward's ruler. This showed that the great king regarded Scotland (except the English fiefs) as a dependent kingdom, for an ordinary fief would certainly have been shared between the heirs of the three daughters. The process was long and curiously intricate, as it now appears (if space served it would be interesting to quote some of the points raised); but Edward got it all through in eighteen months, and Balliol was crowned king in 1292. Edward had held all the great strongholds of the kingdom, twenty-three in number, during the trial, and the greatness of his character is shown by the fact that at the close he gave them all up and honourably retired.

But Edward had set a great aim before him, nothing less than the unification of Britain. He had already annexed Wales, and he now sought to bring Scotland into a more acknowledged dependence upon himself. Unquestionably his idea was statesmanlike and for the benefit of the northern kingdom, but it was not just, and bitter was the result of that injustice. The kings of Scotland had always done homage for these great parts of their lands which they held from England, all Lothian, Strathclyde, &c.; Edward exacted and received of Balliol homage for the whole of Scotland proper, in addition. Not long after, in a law case, an appeal was made to Edward as overlord against Balliol's law courts. Edward heard the case and decided it. Other cases followed, and as Balliol took no steps to meet them he was summoned as a continuous vassal before the English Parliament, and fixing his appearance was ordered to give up three strongholds as security until he should satisfy his overlord. King John, whose kingdom was beside itself with rage at the summons from England, was at this unhappy moment offered an alliance by Edward's great enemy, Philip IV. of France; he accepted, declared war, and a Scottish army crossed the

border on a devastating and plundering raid in 1294. This was the beginning of that fatal alliance with France and enmity with England, which cost Scotland her happiness and her prosperity for centuries.

Edward's view of this transaction was quite clear. He had proposed the oath of fealty to John Balliol, and King John had sworn it. He had exercised rights of sovereignty without question. Now his acknowledged vassal was in rebellion against him and in alliance with his most dangerous foe, and moreover, without any cause of quarrel, was laying waste his fairest provinces. It is no answer to say that Balliol was resisting an unjust claim; to Edward it was not unjust, but just. It was a claim made over and over again, based upon the old "commendation" so often renewed. When Alexander III. in 1278 did homage to Edward at Westminster, Edward demanded, and Alexander refused, the oath for Scotland proper. Other kings before Edward had asserted it, and the transaction with Richard Cœur de Lion was held not to have barred the claim. In justice to a very great king, Edward's side of the matter must be fairly considered, though from the standpoint of after-ages we can see that he was altogether in the wrong. However, it is evident that he must have been enraged beyond measure at the conduct of Scotland, and neglecting all else he rushed northward, seized and took the wealthy and flourishing Berwick, and severely held his hand from offering it altogether. His vengeance was savage; he meant it as a peremptory lesson. Berwick was reduced to a common market town, those who had taken part in its defence being all put to death; and large parts of the town were destroyed. Edward then took Dunbar, Edinburgh, Perth, Stirling, and Elgin, and as a striking memento carried off the crown jewels from Holyrood and the Stone of Destiny from Scone, the superstition running that the fate of the Scottish monarchy was bound up with this stone, upon which all the kings for generations back had been crowned. The stone was placed under the coronation-chair at Westminster. The whole campaign was over in twenty-one weeks, for Edward was a skilled general, and the opposition to him was utterly inadequate. King John submitted himself to Edward's pleasure, was degraded and dismissed after a short imprisonment to his estates in Picardy, where he died in 1315. In Edward's view Scotland was now a forfeited fief on account of Balliol's treason; and granting his original standpoint it certainly was so by feudal law. The seizure of Normandy from John, king of England, by Philip Augustus, king of France, was an exactly parallel case. Edward therefore proceeded to occupy the country, placing commanders on whom he could rely in all the strongholds. The great nobles, most of them barons of England also, submitted at once, and the Celts of the Highlands cared little who was king in Scotland, holding the very loose allegiance they did, and knowing the Lowlands chiefly as a suitable place for the lifting (*i.e.* robbery) of cattle. But the Lowland Scots, although now practically English in race by long generations of immigration, felt the English tyranny greatly, and their love of their Scottish home made them more patriotic than the purely Celtic inhabitants themselves.

At this sad moment, when the cause of Scottish independence seemed hopeless, a deliverer was raised up in these half-English Lowlands, who roused a spirit of resistance among the middle and lower classes of the Scottish people which ultimately triumphed over all the efforts of the oppressor. Sir William Wallace was the son of Sir Malcolm Wallace of Elderslie, near Paisley, a baron of good family, but neither rich nor powerful. Personal wrong and the grinding oppression to which his friends were subjected first stung him to revolt, but patriotism and unextinguishable hatred of tyranny induced him to continue an apparently hopeless contest for the independence of his country. His daring courage and military skill,

combined with his uncommon stature and personal strength made him the idol of his countrymen, and marked him out as pre-eminently fitted to be their leader in a struggle for freedom. He inflicted several bloody defeats upon the English, especially at Stirling (11th September, 1297), expelled them from the country, and even carried the war into the border counties of England, ruling in the name of the deposed King John as Guardian. Edward was abroad, but he quickly returned, crushed Wallace at Falkirk (1298), and regained all the southern or fertile part of Scotland, the patriots still maintaining themselves north of the Forth, though Wallace had fled to the Continent. Gradually as the fortresses of the kingdom fell into the hands of the English, the barons made their peace and submitted to the invader; the country seemed completely prostrate at his feet, and Wallace, on his return to Scotland, was betrayed into the hands of Edward, and was put to death (August, 1305) with great barbarity and cruelty.

But within six months of the death of Wallace the Scots were again in arms, and a new deliverer arose in the person of Robert Bruce, grandson of the competitor for the crown. This youthful baron was a man of great ability and energy, as well as ambition. In his early career, though he exhibited occasional manifestations of sympathy with the popular cause, he yet preserved his allegiance to the English monarch, who appears to have treated him with confidence and favour. The overthrow of the independence of the kingdom and the cruelties inflicted on his countrymen, seem at last to have roused him to a determination to vindicate the rights and liberties of the country. He entered into a bond of alliance with William de Lamberton, bishop of St. Andrews, and Comyn betrayed the scheme to Edward. Bruce fled for his life. This John Comyn of Badenoch was son of Balliol's sister, and therefore stood next to Balliol and his sons in the line of royal descent, coming before the Bruces. Bruce, in his flight, met the Red Comyn in the church of the Grey Friars at Dumfries, and after a warm altercation stabbed him with his dagger. After this outrage, which he was well aware involved him in the guilt of sacrilege as well as treason, Bruce was compelled at once to assert his right to the throne by force of arms. He immediately hastened to Scone with a small band of adherents, and was there solemnly crowned on the 27th of March, 1306. Three months later he was surprised and defeated at Methven, near Perth, by the Earl of Pembroke, and with great difficulty effected his escape into the wilds of Athole with about 500 men. For several years he wandered as a fugitive among the mountains and morasses of the country, enduring the most frightful hardships and privations. His queen and his daughter fell into the hands of the enemy and were kept in close confinement, and three of his brothers and many of his leading supporters were captured and executed. The Countess of Buchan, who, in right of the crowning privilege of the Macduffs, her forefathers, had placed the crown on Bruce's head (though her husband was a Comyn), was confined by the furious Edward in a sort of iron cage at Berwick, and a like punishment befell one of King Robert's sisters. The death of Edward I. (7th July, 1307), in the very sight of Scotland, on his road northwards to punish the refractory kingdom, saved the unhappy country from a terrible fate; and the contest, which during the first years was a struggle for existence, by and by became an aggressive war, in which the efforts of Bruce for the recovery of his dominions were uniform and steady, and at length his great victory at Bannockburn (24th June, 1314) over Edward II. in person, wrested Stirling Castle, the last of the great fortresses of the kingdom, from the enemy, and virtually secured the independence of Scotland. A truce was made in 1323. It was not until 1328, however, after the next English king's accession, that peace was finally concluded between the two kingdoms, and by a treaty concluded at Edinburgh

on the 17th of March, and ratified at Northampton on the 4th of May, 1328, the English monarch, Edward III., renounced fully and for ever all claims of dominion and superiority over Scotland. It must be observed that now, for the first time, Strathclyde and the Lothians became truly parts of Scotland, and not English fiefs. For the confirmation of this important treaty a marriage was agreed upon between the Princess Joan, sister to the English monarch, and David, the youthful son of Robert Bruce. The king did not long survive this glorious consummation of all his toils, and he died on the 7th of June, 1329, in the fifty-fifth year of his age. It must always be remembered that Robert Bruce was a Norman-English baron, and as complete a foreigner to Scotland as any other of Edward's nobles, though he so thoroughly identified himself with his people that it needs an effort of mind to recall it.

King Robert was succeeded by his only son, David, a boy eight years of age. Edward Balliol, the son of the disowned king, aided by several powerful English barons who held estates in Scotland, made a vigorous effort to regain the throne from which his father had been ejected, and was crowned at Scone, 24th September, 1332, acknowledging himself a vassal of Edward III. of England, whose favour he thus gained. Added to this the barons of the Bruce party frequently harried the English border. Eventually, both on his own and his vassal's account, Edward took up arms against Scotland. He invested Berwick in 1333, and the Regent Douglas (King David II. being safely out of the way in France) advanced to its relief. The English were posted on Halidon Hill, and the Scots had to struggle through a marsh. The English archers won the day before ever the armies closed, and the regent himself fell. Berwick submitted and Balliol gave Edward all the Scottish strongholds which owned his claims. The fighting, however, obstinately continued in perpetual petty attacks. Then came the great French war (Hundred Years' War), and Edward's attention went to Calais and Crécy rather than to Scotland. At once the Scottish fates mounted. Robert the High Steward became regent in 1338, and acted so vigorously that Balliol was compelled almost at once to fly the kingdom, while in 1341 David II. and his queen, Joan of England, were recalled and crowned. Five years of peace passed. Then to assist France, his ally, David advanced upon England at the head of an army, believing the whole force of his great neighbour to be exhausted in the life and death struggle with France. The Archbishop of York headed the resident English barons, and David was not only defeated near Durham, but taken prisoner (1346). Sir Ralph Neville afterwards put up a cross to mark the place, whence the battle is often called that of Neville's Cross. For eleven years David remained a captive, while the faithful Robert the Steward governed Scotland wisely as regent. In 1357 David was released on a ransom of 100,000 marks. He proved a dear bargain at the price, being wholly devoted to selfish pleasures. He died in 1370, leaving no children. He had pressed Lionel, son of Edward of England, upon the estates as his successor, but Scotland had had already too much of English power, and mainly at the instigation of Robert the High Steward, flatly refused. The next heir to the throne was therefore the son of his sister Marjory.

Fourth Period.—The Stuarts.—Marjory Bruce had married Walter, hereditary High Steward of Scotland, one of the leaders at Bannockburn, and her son, Robert the Steward, was that excellent regent of whom mention has already been made. These High Stewards began in David I.'s time, when one Walter Fitz-Alan (brother of the William Fitz-Alan who was the ancestor of the earls of Arundel) took service with that prince and was rewarded with rich baronies (Renfrew, and large slices of Teviotdale and Lauderdale), and with the hereditary high stewardship. The later Stewards adopted the title as a surname,

and spelt it as it was pronounced, *Stewart*. Under the French influence which they did so much to foster, the name became spelt *Stuart*, in the French style.

Robert II. succeeded in 1370. His reign was on the whole peaceful, and Scotland breathed more freely. In 1385 Richard II. of England, with 70,000 men, invaded Scotland, and was only prevented from laying waste the country by the Scots doing it themselves, while in revenge the Scots harried the northern counties of England, assisted by French allies. In August, 1388, occurred that fierce little encounter at Otterburn, known best as Chevy Chase, when Hotspur was taken prisoner and forty English knights besides; but the victory was reckoned dear, as the Douglas lay slain on the field. Robert was twice married, and had both sons and daughters by each marriage. His first wife was a cousin, Elizabeth Mure, and as she was within the prohibited degree of consanguinity, the descendants of the second wife many years later, when all was confused or forgotten, frequently made trouble by asserting their better right to the throne than the reigning kings, and challenging them as illegitimate in their origin. But in 1782 Andrew Stuart of Castlemilk found at the Vatican the original papal dispensation granted to Robert Stuart for his marriage with his cousin, and though the discovery was too late to be of service it yet clears, even now, the memory of the good regent and first Stuart king. At his death (13th May, 1390) Robert was succeeded by his eldest son John, who assumed the title of Robert III., since John had been a hated name in Scotland ever since the time of King John (Balliol). He was distinguished for his benevolence, piety, and justice, but he was deficient in the activity and energy which were then indispensably necessary to control his fierce and turbulent barons, and the country was in consequence torn by intestine feuds. The chief power in the state fell into the hands of his two brothers, the earls of Albany and Buchan, men of great ambition and craft, and most unscrupulous in carrying out their selfish schemes. The Duke of Rothesay (the first duke mentioned in Scottish history), the eldest son of the king, is believed to have been starved to death by his uncle the Earl of Albany.

On this James, the only surviving son of the king, a youth in his fifteenth year, was sent to France to protect him from his uncle's intrigues; but the vessel in which he sailed was captured by an English cruiser—a flagrant breach of the law of nations—which completely broke the spirit of the Scottish king, and was probably the cause of his death (4th April, 1406). But the capture of Prince James was not an unmixed evil, for Albany had in Scotland a person pretending to be the deposed (and dead) Richard II. of England; therefore although Henry IV., the newly elected king of England, had, from motives of popularity, declared his intention of conquering Scotland, and had won a victory over the Scots at Homildon in 1402, he was disposed to be quiet rather than call attention to the sham Richard II., while the Scots were peaceable to save their young king. Albany now obtained the prize, which had long been the object of his aspirations, the undisputed regency of the kingdom, which he held till his death (3rd September, 1419). The two chief events in Albany's regency were the foundation of St. Andrews University in 1410, and the battle of Harlaw, 21st July, 1411, important rather in its meaning than in its actual size. This was a victory gained by the regent over Donald, Lord of the Isles and acknowledged head of the Celts, who owned half the kingdom by measure, though his territories were of little value as regards fertility, and who felt strong enough to aim at the throne. This deliverance from Celtic savagery was felt at the time as a second Bannockburn. Albany was succeeded by his son Murdoch, a person of an easy indolent character, destitute both of his father's ability and ambition. Under his rule the country was turned into one scene of rude unlicensed anarchy.

A strong desire began to be entertained by all classes for the release of their king, whose unjust captivity, if it was not caused, had without doubt been prolonged, by the intrigues of his unprincipled uncle. Duke Murdoch himself grew weary of his office, and exerted himself so zealously for the liberation of James that the negotiations for that object were speedily brought to a successful conclusion, and after a captivity of nineteen years' duration the Scottish king returned to his own dominions in 1124. Forty thousand pounds were exacted by England for his maintenance. It is worthy of note that a small Scottish army was sent to help the French against Henry V. of England, and was almost cut to pieces at Verneuil (1424). The remnant became the famous Scottish *Achers*, the bodyguard of the French kings, and were entirely composed, officers and private soldiers, of men of gentle birth. Readers of Sir Walter Scott will remember the graphic description of them in "Quentin Durward."

The character of James I. was one of remarkable power. His natural talents were of the highest order, and had been cultivated with great care. He was an accomplished scholar, poet, and musician; was skilled in all the warlike exercises and observances of chivalry, and excelled in manly and martial feats. He set himself at once to diminish the overgrown authority of the barons, to rescue the commons from oppression, and to enforce the laws. His vengeance fell with just severity on the House of Albany; but the execution of Duke Murdoch, with his two sons and his aged father-in-law, the Earl of Lennox, well merited though it was, excited deep and general fear among the baronage, and led indirectly to his own death. The severity with which he treated the nobles made him many enemies, and he was at length assassinated in 1436 in the monastery of the Black Friars, at Perth, by Sir Robert Graham, the Earl of Athole, and some accomplices who had been dependants of the house of Albany. Margaret, eldest daughter of James I., was the queen of Louis XI. of France.

James I. was succeeded by his eldest son James II., a boy only six years of age. During his long minority the history of the country is little else than a dreary record of civil anarchy and unpunished crime. James assumed the reins of government in 1449, and exerted himself with great vigour to restore his kingdom to order, and to strengthen the power of the crown. In the prosecution of these objects he came into collision with the powerful and arrogant family of Douglas. One of the heads of this house he stabbed in a fit of passion in the Castle of Stirling; his successor he defeated in battle and drove into England, and the immense estates of the family were divided among the barons who had assisted in vindicating the royal authority. The battle referred to was fought at Arkinholm, in Fife, in 1454, and it did no less than settle whether James Stuart or James Douglas should be king of Scotland. While he was thus successfully carrying out his plans for the welfare of his kingdom James unwisely suffered him self to be entangled in the contest for the English crown between the rival houses of York and Lancaster. He espoused the cause of the latter, and was killed by the bursting of one of his own guns at the siege of Roxburgh (1460), in the twenty-ninth year of his age. The second university in Scotland was founded at Glasgow in this reign.

James II. was succeeded by his eldest son, James III., a child of only eight years of age, who grew up an accomplished art-loving monarch, sadly out of place among his rude, warlike, turbulent barons; these thwarted his measures, plotted against his authority, murdered his favourites, and ultimately slew him in battle at Sauchieburn (1488), in the thirty-sixth year of his age. In this reign, however, Scotland gained the Hebrides, Orkneys, and Shetlands. For a long time the rent had not been

paid, and Norway was pressing for a settlement. The matter was arranged by the marriage of James in 1469, with Margaret, daughter of Christian, king of Norway, the arrears being given up, and 60,000 florins in addition being promised as dowry. The dowry not being immediately payable the Orkneys and Shetlands were given over in pledge. These islands have never been redeemed, nor has the rent of the Hebrides been claimed, and thus they have gradually and peaceably passed to their legitimate owners. [The final ending of the matter was their passing to Scotland formally as the dowry of the Danish wife of James VI.—James I. of England—in 1589.] Also, the Lord of the Isles was discovered in treasonable relations with Edward IV. of England, and advantage was taken of this to break up his vast dominions. The crown thereby became distinctly more powerful.

James IV., eldest son of James III., succeeded to the vacant throne in his seventeenth year. He was possessed of considerable ability and vigour, but his love of pleasure hurried him into many foolish and criminal excesses. He adopted various new and salutary measures, however, for the promotion of the trade and commerce of the country, which, during the greater part of his reign, enjoyed the blessings of peace. His marriage to the Princess Margaret of England (sister of Henry VIII.) contributed to this result. But when war broke out between Louis XI. of France and Henry VIII. in 1513, James was unfortunately induced to take part with the old ally of Scotland, and perished along with the greater part of his nobility in the fatal battle of Flodden—one of the greatest national disasters ever experienced by Scotland. Not only the royal house, but practically every noble family lost its chief on this fatal day; and Scotland, which had risen to some faint reflection of the prosperity she had once formerly enjoyed under Alexander III., was thrust back into confusion once again. The University of Aberdeen was founded by this king, a lover of all learning and culture, in 1500. It was the third university in Scotland.

During the minority of James V., who succeeded his father, the country was torn by the discussions of the nobles, the intrigues of the English and French courts, the contests for supremacy between the Duke of Albany and the Douglasses, and the headstrong and passionate behaviour of the English queen-mother. A state of almost complete anarchy ensued, and the sufferings of the people were beyond description. When James took the reins of government into his own hands, by escaping from his guardians to Stirling Castle, in 1528, he exerted himself vigorously to restore the royal authority and the supremacy of the law, and to remove the complicated and oppressive burdens which the barons had laid upon the community. He pursued the Douglas faction with unrelenting severity, rigorously punished the excesses of other powerful nobles, and promoted the clergy to those great offices of state which had usually been filled by temporal barons. Unfortunately this line of policy led him to take up a hostile position towards the principles of the Reformation, which had for some time been silently making progress among his subjects; and his alliance with Marie de Guise, combined with the influence of his principal adviser, Cardinal Beaton, induced him to become a persecutor of the leading reformers, several of whom were burned for heresy. To crown all, the clergy, who dreaded the influence of Henry VIII. over his nephew, succeeded by their intrigues in involving James in a war with England. But when the array of the kingdom was mustered at Fala his nobles all but unanimously refused to follow him across the Border, and he was in consequence compelled to disband his army. A separate body of 10,000 men were defeated near the Solway by a mere handful of English cavalry, and many of the leading nobles were taken prisoner in circumstances which led the king to believe that they had wilfully given

themselves up to the enemy for the gratification of their personal revenge. This idea preyed upon his mind, and he died soon after, at Falkland, of a broken heart, in the thirty-fifth year of his age, leaving his crown to an infant eight days old, the beautiful and accomplished Mary, the most unfortunate of all her unfortunate race. When the news of the birth of his child was brought to the dying king he was heard to murmur, "It came wi' a lass, and it'll gang wi' a lass," meaning the crown of Scotland, which came to the Stuart family through Marjory Bruce. He proved wrong however. James V. is the first king of Scotland of whom we have a portrait. He had red hair, but was notwithstanding very handsome. Though not liked by the nobles he was adored by the common people. He loved them in return, and often would mix freely among them, assuming some simple disguise. Like his ancestor James I. he was distinguished as a poet.

Henry VIII. now determined to gain Scotland by marrying its heiress, Mary, to his son Edward, prince of Wales, and sent several Scottish nobles on whom he could rely ("the Assured Scots") back to their country to arrange this matter. Treaties for alliance and marriage were in consequence agreed to. Next year, however, the regent James Hamilton, earl of Arran (next heir to the throne after Queen Mary, as being a descendant from James II.), induced the Estates to refuse to ratify the treaties. Henry sent Seymour, earl of Hertford (afterwards Duke of Somerset and Protector), to punish the malcontents; and Leith and Edinburgh were sacked and burned, and all the country south down to the Border. A like raid took place next year, and the ruins of Kelso, Melrose, Dryburgh, Roxburgh, and Coldingham bear mute witness to its severity. Between 200 and 300 towns and villages were left in ashes. The death of Henry in 1547 produced no change in English policy, and Somerset still sought by force of arms to compel the Scots to observe the marriage treaty between their young queen and Edward VI. The sanguinary defeat of the Scots at Pinkie (1547) greatly exasperated the feelings of national antipathy, and caused the Regent Arran and the queen-mother to throw themselves more decidedly into the arms of France. The Scottish Parliament finally determined in 1548 that the queen, then in her sixth year, should be married to the French dauphin, and in August of that year she arrived in safety at the court of St. Germain. The peace of Boulogne between France and England led in 1550 to a cessation of hostilities between the latter country and Scotland; and thus after a sanguinary war which had lasted for seven years, and had inflicted great misery on the Scottish people, the English were obliged to abandon the project of forcing the Scots into a matrimonial alliance.

Fifth Period—The Reformation.—During the ten years which followed the restoration of peace the principles of the Reformation continued to make steady progress among the Scottish nation, in spite of the resistance offered by the clergy and the queen-mother, Marie de Guise, now regent. Arran had been created Duc de Chatellerauld, and had left Scotland for France. The Protestant party, headed by the illustrious John Knox, gained ground year by year. The queen-dowager died on the 10th of June, 1560, and a month later the Protestant Confession of Faith was adopted by the Parliament, and the power and jurisdiction of the Pope were abolished in Scotland. At this period Francis II. of France, the husband of the Queen of Scots, died, and Mary soon after returned to her own kingdom (19th August, 1561). She was received with great enthusiasm by all classes of her subjects; but in a brief space causes of dissatisfaction arose between the queen and the Protestant party, which soon deepened into permanent alienation. They were fiercely opposed to the toleration of the Roman Catholic creed in Scotland, while she on her part, strongly attached to that faith and to the arbitrary policy of her uncles, the Guises, peremptorily refused to sanction the pro-

ceedings of the Parliament, which had abolished the papal supremacy and had established the Protestant doctrines and worship. To render Mary's situation still more complicated and perplexing, she soon came into collision with Queen Elizabeth of England. She was eager to obtain a recognition of her right of succession to the English throne, failing Elizabeth's issue, and with that view she incessantly plotted, so that she became a serious danger in the eyes of English statesmen. In pursuance of her plan (Elizabeth remaining unmarried) Mary felt it incumbent to marry. She determined to follow her own inclinations, and in spite of the remonstrances of the Earl of Moray (James Stuart) her natural brother, and her wisest counsellor, she married (29th July, 1565) Lord Darnley, the eldest son of the Earl of Lennox, and grandson of Margaret Tudor, and therefore Mary's own cousin, a weak and profligate youth utterly unworthy of her affection. The dissentient nobles, Moray, Argyle, Lethington, and the Protestant party, took up arms to prevent the marriage, but were driven from the country by the prompt and vigorous measures of the queen, and compelled to take refuge in England, where they were disowned by Elizabeth, to whom they appealed, and repulsed as traitors to their royal mistress. Mary's satisfaction in this triumph, however, was grievously diminished by the unworthy behaviour of her husband. His folly, falsehood, and profligacy soon estranged her affection and forfeited her confidence. He ascribed this change in the treatment he received from the queen, not to his own gross misconduct, but to the influence of her foreign secretary David Rizzio, by whose advice he suspected Mary had refused (as she always did) to bestow on him the crown matrimonial. Rizzio was believed to be an emissary of the papal court, and had made himself obnoxious on various grounds to the fierce and arrogant Scottish barons, especially by the part he took in urging that a sentence of forfeiture should be pronounced against Moray and the other banished lords. A conspiracy was formed for his assassination, to which Darnley as well as his father (the Earl of Lennox), Morton, Ruthven, and other leading nobles were privy, and the hapless foreigner was murdered almost in the queen's presence, with circumstances of great atrocity, at Holyrood, as she sat at supper, on the 9th of March, 1572. The conspirators had resolved to detain the queen a prisoner till she should consent to all their schemes, but she succeeded in making her escape to Dunbar, along with her husband, over whom she had completely resumed her ascendancy, and was instantly joined by James Hepburn, earl of Bothwell, a great favourite of the queen's, and by numbers of the loyal barons with their retainers. The banished conspirators fled in dismay to Berwick, and solicited the protection of Elizabeth. The weak, cowardly, and vacillating Darnley had now forfeited the confidence of all parties, as well as the affection of the queen. A conspiracy for his murder was entered into by Bothwell, Marland, Huntly, Argyle, and Sir James Balfour. Whether or not Mary was privy to this plot is one of the "vexed questions" of history, though the balance of evidence is certainly against her, and both Froude and Burton declare themselves convinced of her guilt. Be this as it may, the unhappy and vicious youth was treacherously murdered on the 9th of February, 1567, at the Kirk-of-Field, nearly on the spot now occupied by the south-east of Edinburgh University building, and the house itself was blown up with gunpowder. He had been ill at Glasgow of small-pox, and was nursed by his father. Mary suggested his removal to a healthier locality, and he was brought to the Kirk-of-Field. Here she had called upon him and greeted him with a show of affection upon his recovery.

The marriage of the widowed queen to the Earl of Bothwell, whom all men regarded as the murderer of her husband, took place in the course of a few weeks, and was speedily followed by a violent outbreak of public indigna-

tion. Bothwell had divorced his own wife to marry the queen, and married her on the very day he received his freedom. He was allowed to escape, but Mary fell into the hands of the insurgent nobles (battle, or rather surrender, of Carberry Hill, 15th June, 1567), who imprisoned her in the Castle of Lochleven, and compelled her to resign her crown in favour of her son, and to appoint Moray, her brother, regent during the minority of the king. Her romantic escape from Lochleven on the 2nd of May, 1568, her defeat at Langside by the Regent Moray ten days later, and her flight into England followed in rapid succession. Her nineteen years' imprisonment in England were spent in continued intrigues to regain her liberty and the throne which she had forfeited. She was at length alleged to be implicated in the conspiracy of Babington against the life of Elizabeth, and was declared guilty by the commission appointed for her trial. The English queen, after many delays, at length signed the warrant for Mary's execution, which was carried into effect on the 7th of February, 1587.

During the greater part of Mary's imprisonment Scotland was governed by a succession of regents, who exercised authority in the name of her son, James VI., and all of whom, save one, came to a violent end. Moray, the first and by far the ablest and best of these, was assassinated in 1570, at Perth, by Hamilton of Bothwellhaugh. His successor, Lennox, the king's grandfather, was slain in a skirmish at Stirling in 1571. Mary, who followed him, held office for little more than a year, when he died, it is believed, of grief at the distracted state of the country. The Earl of Morton was then appointed regent, a man of undoubted ability and courage, but sordid and selfish, avaricious and profligate. With the assistance of Elizabeth he succeeded in completely crushing the queen's party in Scotland; but his oppression of the church, and the harshness and severity with which he treated the other nobles, and even the young king himself, caused him to be universally detested, and in the end he was driven from power, brought to trial as an accomplice in the murder of Darnley, found guilty, and executed in 1581.

On the death of Morton the young king nominally assumed the reins of government, but the actual power was in reality wielded by his favourites, Esme Stewart, duke of Lennox, and Captain James Stewart, second son of Lord Ochiltree—the last a weak but amiable nobleman, the latter an ambitious, rapacious, and unprincipled adventurer, whom James created Earl of Arran. The venality, tyranny, and abuses of his rule soon became intolerable: a combination was formed against him and he was driven from power, and soon after murdered by one of the Douglases, in revenge for his share in the death of Morton. The country continued to be torn by rival factions, which the feeble hand of James VI. was powerless to repress; while his aversion to the Presbyterian church, and his fondness for internecine wars with its government and ministers, involved him in continued broils and embarrassments. He at length attained the great object of his ambition, the succession to the English throne, on the death of Elizabeth, 23rd March, 1604. He is in fact more familiar to history as James I. of England than as James VI. of Scotland. This auspicious event united the two crowns, and therefore closes the history of Scotland as a separate kingdom; but it was not until the year 1707 that an incorporating union of the two countries was carried through, and a common legislature and ministry appointed for their government.

Sixth Period—The Union.—The project of a legislative union between the two kingdoms had been broached by James VI. as soon as he was seated on the English throne, but he found himself unable to overcome the opposition both of the Scottish people and of the English Parliament. In the time of the Commonwealth, however, an actual union between the two countries was effected, and five

representatives from Scotland sat in the Parliament summoned by Cromwell in 1653. In the following year a decree was issued by the Protector, on his own authority, declaring Scotland and its dependencies to be incorporated with England, and providing that thirty members from Scotland should sit in every future Parliament. This was accordingly done in the Parliaments which met 3rd September, 1654, and 17th September, 1656. At the Restoration this was rescinded, along with all the other changes effected in the constitution during the Commonwealth; but the project of a union with Scotland was speedily renewed in the reign of Charles II., and again in that of William III., who in his last message to the House of Commons, 28th February, 1702, only four days before his death, in very earnest tones recommended this measure to the consideration of Parliament. But so obstinate was the resistance offered to the proposal, especially on the part of the Scottish people, that it was not until four years after the accession of Queen Anne (22nd April, 1707) that the union was actually accomplished, and even then it was regarded with feelings of the deepest indignation by the great body of the Scottish nation.

The chief provisions of the union, as finally agreed on, were that, in default of the issue of Queen Anne, the succession to the throne of the United Kingdom should be vested in the Princess Sophia and her heirs; that the two countries should be governed by one Parliament; that all the subjects of the United Kingdom should enjoy full freedom of trade, both at home and in the colonies, and a community of all other rights and privileges; that the laws concerning public right, policy, and civil government should be the same in both countries; that Scotland should retain her own national church, her own system of civil and municipal laws, and her own courts, civil and criminal, for the administration of justice; that all hereditary offices and jurisdictions should be maintained; that the rights and privileges of the royal burghs should be guaranteed; that Scotland should send forty-five members to the imperial Parliament (a number altered afterwards to sixty, and in 1885 to seventy-two); and that only sixteen of the Scottish nobles, chosen by election from the whole body, should obtain seats in the British House of Peers, but that all the other privileges of their rank should be preserved entire. It is deeply to be regretted that a measure so essential to the peace and prosperity of both kingdoms should have been carried through in a manner which excited bitter opposition at the time and long rankled in the minds of the people of Scotland. The joint career of the two nations in consequence began, and for many years proceeded, in a most inauspicious manner. But through the healing influence of time the animosities and jealousies which it excited died away, and the ultimate results of the union have fully vindicated the wisdom of the measure.

Succession of Kings—Celtic Period.—Kenneth Mac Alpin, king of Scots, became King of Piets, 843; Donald, brother; Constantine I., son; Grig, usurper, 882; Constantine II., grandson of Kenneth, 900; Malcolm I., cousin, 943; Indulf, 954; Duff, Colin, Kenneth II., Constantine III., Kenneth III., Malcolm II., grandson of Malcolm I., 1004; Duncan, grandson, 1034; Macbeth, usurper, 1040; Malcolm III., Canmore, son of Duncan, 1057; Donald Bain, brother, 1093 (deposed 1097).

Period of English Influence.—Eadgar, son of Malcolm III. and Margaret of England, 1097; Alexander I., brother, 1107; David I., brother, 1124; Malcolm IV., grandson, 1153; William I., "the Lion," brother, 1165; Alexander II., son, 1214; Alexander III., son, 1249; Margaret, the Maid of Norway, granddaughter, 1286, died on her voyage to Scotland in 1290.

Struggle for Independence.—Interregnum, Edward I. of England, governor, 1290-92; John (Balliol), grandson of great granddaughter of David I., 1292, deposed 1296,

Edward I. of England conquering the kingdom. Robert Bruce, grandson of Robert Bruce, competitor with Balliol, and descendant of David I., crowned 1306; David II., son, 1329, died 1370.

The Stuarts.—Robert II., grandson of King Robert Bruce, 1370; Robert III., son, 1390; James I., son, 1406, crowned, 1424; James II., son, 1437; James III., son, 1460; James IV., son, 1488; James V., son, 1513; Mary, daughter, 1532; James VI., son, 1567 (became king of England as James I., 1603); union of the crowns of Scotland and England, 1603; union of the two kingdoms, under Anne, the last Stuart, 1707.

SCOTTISH LANGUAGE AND LITERATURE. The earliest form of the Scottish language, as distinct from the Gaelic, in other words, of the language used in the lowland districts of Scotland, was simply the Anglian dialect of Old English. After the Norman conquest it acknowledged, like the rest of English, the influence of the speech of the Norman invaders, and there can be little doubt that it was considerably affected by the migration across the borders of English settlers, and the intercourse which was maintained between the two countries from the middle of the eleventh to the close of the thirteenth century. The first vernacular writers of Scotland, such as John Barbour, who died about 1394-95, and whose only existing work is an epic narrative, "The Bruce," written about 1376, express themselves in a language closely akin to that which was employed by their English contemporaries. He who can read Chaucer can easily read Barbour or Wyntoun, as the reader will perceive from the following specimens. The first is a passage from Chaucer's "Canterbury Pilgrimage":—

"A clerk ther was of Oxenforde,
That unto logike hadde long ȝeo.
As ilke was his hors as is a rake,
And he was not ȝight fat I undertake;
But looked holwe, and thereto soberly.
Ful thuredbare was his overet courtsey,
For he hadde gettin him yet no benefice,
He was nought worldly to have an office."

Compare this with an extract from Barbour:—

"A! Fredome is a nobill thing!
Fredome mayse man to haiff liking!
Fredome all solace to man giffis!
He levys at ese that frely levys!
A nobill hart may have nane ese,
Na ellys nocht that may him please,
Gyff fredome fail the: for fie liking
Is yearnyng our all othir thing."

A similar vernacular was employed by the wandering minstrel known as Blind Harry, the author of a metrical chronicle of the life of Wallace, which continued for many generations to be the favourite volume of the Scottish peasantry, and had no small influence on the imagination of Robert Burns.

The Scottish language preserved its Anglican character almost unimpaired for two centuries. It is clearly discernible in the poetical works of James I. of Scotland (1394-1436) and William Dunbar (circa 1440-1520), when it begins to exhibit a marked contrast to the more polished language of the now greatly altered English writers. While the difference between Chaucer and Barbour is so little, that between Dunbar and the Earl of Surrey is evident to the most careless reader. The principal poem of James I. "The King's Quhair" (Quire or Book), was composed during his imprisonment at Windsor, and describes his love passages with his future queen, the Lady Joan Beaufort. Its merits are of a very high order; it is full of elegant refinement both of thought and expression. It is, however, largely "Anglicised" in consequence of the king's long detention at the English court. The seven-lined stanzas in which the poem is written were afterwards called *roial rime* in consequence. The English influence is also conspicuous in the "Testament of Cresseid," by

Robert Henryson, chief schoolmaster at Dunfermline, who died about 1505 or 1506. He also wrote a series of fables, and some miscellaneous poems. Bishop Gawain Douglas (1474-1522) was an allegorical and descriptive poet of no ordinary ability. His chief claim to distinction, however, is his version of the "Æneid," remarkable for its accurate conception of the spirit and meaning of the Latin poet. But the greatest name of the period is that of William Dunbar, who may justly be placed in the very front rank of Scottish authors. In satire he is almost equal to Burns, in depth of moral feeling superior; in love of nature and fresh free portraiture of character he lays claim to comparison with Chaucer. The first thing that strikes the reader of his poems is their variety and intellectual range. His genius combined the excellencies of many masters. His "Golden Targe" and the "Thistle and the Rose" are allegorical poems full of colour, fancy, and music. His "Two Married Women and the Widow" has a good deal of Chaucer's slyness and humour. "The Dance of the Deadly Sins," with its fiery bursts of imaginative energy, its pictures finished at a stroke, is a prophecy of Spenser and Collins, while his "Flytings" are torrents of the coarsest vituperation. And there are whole flights of occasional poems, many of them sombre-coloured enough, with an ever-recurring mournful refrain, others satirical, but all flung off, one can see, at a sitting. Several of these short poems are almost perfect in feeling and execution. Another distinguished Scottish poet of this period was Sir David Lindsay of the Mount (1490-1557), whose productions abound in bright satirical touches, gay and graceful pictures, and shrewd proverbial wisdom. The principal are, "The Dreme," "The Complaynt," "The Complaynt of the King's Papage" (Peacock), and "The History of Squire Meldrum." Nor can the contributions of the unhappy James V. (1513-12) to Scottish literature be passed over. This prince was fond of penetrating among his people in disguise, and knew the manners and habits of the common folk well, and loved their speech. His two poems of "Christ's kirk on the Green" and the "Gaberlunzie Man" both deal with peasant life, and are gems in their way.

The sixteenth century contributed no great names to Scottish literature. The country was convulsed by the struggles of rival factions, by the assaults of enemies without and the machinations of enemies within, by the intrigues of profligate nobles and ambitious priests, so that scant hearing could be obtained for any who attempted to pipe on "Apollo's reed." Though in England Shakespeare, Spenser, Ben Jonson, and a host of other illustrious names cast an enduring glory over our literature, the only minstrels in Scotland were Alexander Scott (circa 1570), Sir Richard Matland (1496-1586), Alexander Montgomerie (1597), Alexander Hume (1599), and the Earl of Stirling (1580-1610), whose productions scarcely rise above the ballad order. The overmastering influence of English authors is again visible in their successors, William Drummond, of Hawthornden (1586-1619), whose friendship with Ben Jonson connects him still further with the English school. He rose far above his contemporaries in poetical genius, and his poems are replete with graceful fancies and tender sentiments expressed in melodious verse. His sonnets are especially beautiful, not unworthy to be classed with those of Sidney and Wither. The versification is correct, and the style polished. The exquisite lyrics of Drummond's contemporary, Sir Robert Aytoun (1570-1588), are in the smoothest and most graceful English, and it is to be distinguished, in so far as language is concerned, from those of Suckling and Lovelace.

George Buchanan (1506-82) wrote in Latin, and with such fluency and accuracy that he has been somewhat absurdly styled the Scottish Virgil. His most finished poetical work is a paraphrase of the Psalms. A version

of the Psalms in Latin was also accomplished by Arthur Johnston (1587-1641), which Hallam pronounces little inferior to that of the elder poet in "elegance of style or correctness of Latinity." Buchanan, as a prose writer, is remarkable for his command over the resources of a dead language. His prose compositions in his native tongue are, on the contrary, rude and barbarous in the extreme, and exhibit the sad decline of the Scottish vernacular in freedom and grace from the days of Dunbar and Lindsay. John Knox (1505-72), apart from his renown as the leading spirit of the Reformation in Scotland, deserves to be remembered for his admirable history of that great event, which is full of vigorous and masculine writing. On the score of style little can be said in favour of the work of David Calderwood (*circa* 1620), "The True History of the Church of Scotland;" but it is valuable as a repository of original information.

Scottish literature found its next development in a theological direction, and for half a century produced little but controversial treatises tinged with the dark colouring of a severe Calvinism. The genius of Scottish poetry seemed asleep or dead until revived by the genius of Allan Ramsay (1686-1758), whose "Gentle Shepherd," written in the vernacular, sparkles with the true golden ore. As a faithful and vivid picture of Scottish life it may be compared with Burns' "Cottar's Saturday Night;" and his songs are characterized by genuine pathos and picturesque allusion. The language is pure, vigorous, and correct—the genuine "Doric" to which Burns and Motherwell and Tannahill have since accustomed us.

The closer union of the two countries was now promoting the cultivation of English literature, and Scottish authors, attracted by its wealth and abundance, began to draw from thence their inspiration. This was particularly the case with the prose writers, who ceased to employ the vernacular in their more elaborate compositions. David Hume was a Scotsman, so was Adam Smith (1723-90); their intellectual training was Scotch, and their genius distinguished by the national acumen and shrewdness, but it was in English that of a nervous and finished style, that they found a suitable vehicle for their thoughts.

The poets, as was natural, clung chiefly to the vernacular. Yet some of the finest compositions of William Hamilton (1704-51) are written in pure English; and the same is true of the lyrics of Robert Crawford (died 1733), though they have an essentially Scottish ring. Robert Burns (1759-96), the greatest name in Scottish literature, gave fresh dignity and grandeur to his native tongue by his

humorous sketches, and his glowing pictures of Scottish domestic life. From John o' Groat's House to the Land's End his works were, and still are, eagerly read and admired as those of a genuine Scottish poet, and the world hardly knows which to prize more warmly, the vigour and movement of the fiery spirit and dashing of "Tam o' Shanter," or the subdued pathos and tender feeling of "The Cottar's Saturday Night." The inferior in genius, but scarcely less national in tone and character, were Robert Tannahill (1774-1810), Adam Cunningham (1784-1842), William Motherwell (1797-1835), and James Hogg (1770-1835), better known as the Ettrick Shepherd.


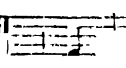
English is now the language of Scottish writers, who only resort to the vernacular of Burns and Ramsay as English writers resort to the vernacular of Chaucer and Spenser, that is, as an exercise of skill and in gratification of national feeling. The two countries are now united by common interests, common sympathies, and by the memories of great deeds achieved by their mutual energy. Their literature, therefore, has necessarily undergone a corresponding modification. It cannot be denied that Scotland has worthily maintained her national honour in every department of this common literature; but not even from their

own countrymen do Scott and Professor Wilson, P. Frazer Tytler, Dugald Stewart, Dr. Chalmers, Lord Jeffrey, J. H. Burton, Colonel Mure, David Masson, Sir William Hamilton, Hugh Miller, and Thomas Carlyle receive a more hearty tribute of love and admiration, a warmer welcome, or a more ungrudging recognition, than from the reading public of the sister country. The poets, Jean Ingelow, Alexander Smith, and Robert Buchanan, command the suffrages of both countries, and write in English pure and forcible. English literature is all the healthier and richer for the infusion of northern blood. Scottish life, and history, and scenery, and feelings still demand Scottish interpreters. When Scotland was united to her great neighbour, she became partaker of an intellectual inheritance far richer than she had to offer to that neighbour in return; and since that period, while much of the effort of Scotland has been in continuation of her own separate development, much has necessarily and justly been ruled by the law of her fortunate partnership.

Some admirable remarks on the Scottish language and literature will be found in Mr. John Hill Burton's "History of Scotland from the Revolution," and Hallam's "Introduction to the Literature of Europe." Dr. Murray's "Dialect of Southern Scotland" should also be consulted.

SCOTTISH MUSIC. There is a considerable body of very fine and markedly characteristic music bearing the Scottish name, much of it ancient, some of it evidently identical with old English and more with old Irish music. This is not to be wondered at, since the Scots of Ireland and the Angles of Northumbria united to form the race of the Lowlands, who long possessed all the culture of the northern kingdom. And in the same way that many characteristics of the Anglian speech are more truly preserved in what is called "Scotch" than in the English of our own day, so also do some of these Scottish tunes undoubtedly represent to us more nearly the original ones than the modified English and Irish versions. "When the king comes ower the water" and "Robin Adair" are by origin Irish, as "Tak' your auld cloak about ye" and "Lochaber" are English, for example, though they have long been the legitimate property of Scottish minstrels also. The large collection of Jacobite songs forms a great feature in the Scottish music.

Possibly influenced by the curious scale of the bagpipe (see SCALE) or by that instinctive avoidance of the Fourth and the Seventh of the scale common to many nations in an early state of civilization, many of the older Scottish tunes are in what are called PENTATONIC scales, *i.e.* scales with only five principal notes instead of seven to the octave. Hence the old-fashioned recipe for the construction of a Scottish tune, which bade the composer use the black digitals alone. The second characteristic feature of Scottish music is a fondness for dotted notes, which causes the tune to spring and lilt along with a gaiety remarkably fascinating even to "foreigners," and to a Scotsman eminently pleasing. The common phrase for this style of composition is the "Scotch snap," and it is so familiar that an example is scarcely needed. The difference between any Scottish and Irish version of the same melody will illustrate the point concisely; take for example the close of "Robin Adair" and "Eileen Aroon."

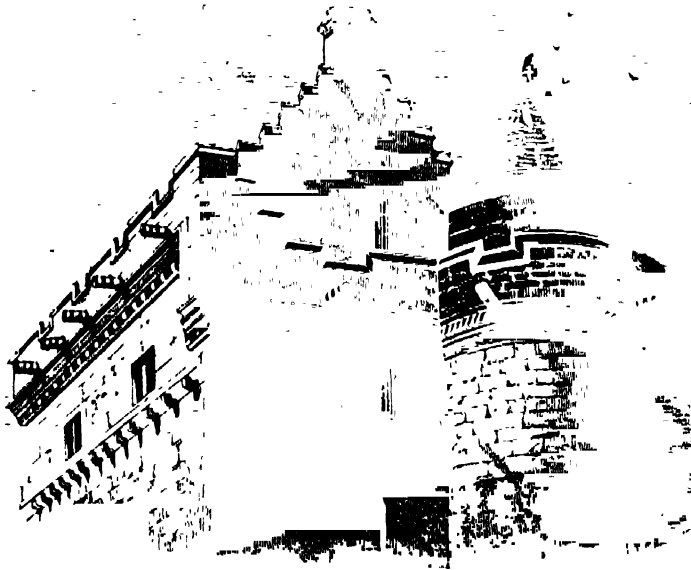
Scottish ("Scotch snap").	Irish.
	
Ro - bin A da - ir.	Ei - leen A - roon.

Of instrumental music, Scotland has also a large national collection, namely the reels, strathspeys, and pibrochs for the bagpipe, many of them of entrancing beauty and wildness.

Famous collections of Scottish music are H. Playford's "Scotch Tunes" (1700); Allan Ramsay's "Tea Table

Miscellany" (1724 and 1726); Johnson's "Museum," for which Burns wrote many of his finest lyrics and collected many of the airs of the peasantry, six vols. each of 100 airs (1787-1803); Surenne's "Dance Music of Scotland" (arranged for the Pianoforte, 1841); Wilson's "Songs of Scotland" (eight books, 1842) and Wood's (1848); and a very noble selection, "Select Scottish Songs," by Professor Sir George Macfarren (1874).

SCOTTISH ARCHITECTURE. The earlier church architecture of Scotland (Melrose, Dryburgh, Jedburgh, &c.) is in no substantial point different from the beautiful Gothic architecture of England; but there occurs a remarkable and characteristic group of buildings of the sixteenth and seventeenth centuries which is somewhat special to Scotland. These are the castles and half-fortified baronial mansions, with some Gothic elements and some touches of the classic Renaissance, presenting a curiously interwoven and some-



Falkland Palace

times successful mixture of styles. The strongholds were built with stubborn materials on rocky sites, and decoration was both unsuitable and difficult to manage. Yet upon the stern, plain, gloomy keep, with its narrow windows, were engrafted designs imported from France during the long struggle with England, when France was Scotland's chosen friend and close ally. It is instructive to compare the elaborate detail of the *François Premier* style with its counterpart in Scotland. But the round projecting turrets, the corbelled projections, the pointed roofs, the battlemented parapets, and gables of step-like outline which are found in the French Renaissance are features also of the Scottish style. Windows are plain, square-headed, and small, but doorways are often arched and ornamented. Cawdor, Glamis, Fyvie, Dunrobin, and Stirling are among the finest examples, to which may be added the picturesque palace at Falkland, the accompanying illustration of which well serve to illustrate the style at its best.

SCOTTISH SCHOOL OF PHILOSOPHY. A brilliant series of philosophers, extending from the middle of the eighteenth to the middle of the nineteenth century, contributed largely to that leadership of thought which Scotland at that time enjoyed. Hume's daring attack on all dogmatic philosophy, from an ironically sceptical stand-

point, brought out the first of the Scottish school in the person of Dr. Thomas Reid, professor at Aberdeen and later at Glasgow, whose "Inquiry into the Human Mind on the Principles of Common Sense" was published in 1763. This is a strong effort against both Hume and Berkeley, and though of course only here and there successful, is a remarkable work, containing much insight and valuable original thought. With Reid were associated James Oswald and James Beattie. (Reid died in 1796.) The next considerable name among the Scottish metaphysicians is that of Dugald Stewart (1753-1828), professor of mathematics, and later of moral philosophy, at Edinburgh, who followed Reid, but systematized and improved the "common sense" views far beyond the powers of his model. His "Elements of the Human Mind" (1792-1827) is a remarkable book, elegantly written; and still more charming are the "Philosophical Essays" (1810-18). Stewart was followed by

Dr. Thomas Brown (1778-1820), who was associated with him in the chair of philosophy at Edinburgh in 1810. Brown was an eminent student in biological and other subjects, as well as distinguished as a philosopher. His "Inquiry into the Relation between Cause and Effect" is as acute and subtle a work in analysis and as eloquent in exposition as modern philosophy affords. Brown followed Stewart and Reid in demanding, instead of improved first principles, an original intuitive power of the mind to apprehend great truths. His lectures ("Philosophy of the Human Mind") were extremely impressive and powerful, and they were published in 1820, after his death. Much of his work has been adopted by John Stuart Mill; and even Spencer, Bain, and the modern evolutionist and associational school learn their valuable doctrines as to the *muscular sense*

from Brown, whose medical knowledge here stood him in admirable stead. Brown's work, on the whole, is a revolt against Reid's "common sense" views: as a scientific man such vague and shifting names were abhorred by him. His consequent inquiries into actual sensation were most valuable contributions to philosophy. Sir James Mackintosh (1765-1832) is the next distinguished name in the Scottish school, and he developed its views rather on the ethical side (of conscience, &c.) than metaphysics proper.

Finally, the Scottish philosophers culminated in Sir William Hamilton (1788-1856), by far the most conspicuous philosopher of the century which the United Kingdom produced, and the most learned student of his time. His edition of Reid contains much of his best work, and is a truly wonderful monument of ingenuity and industry. His "Philosophy of the Unconditioned" was published in 1829, and the "Philosophy of Perception" in 1830. The English philosopher Mansel is his most conspicuous follower, but his influence is felt all through contemporary thought. The school, however, could not stand the incisive attacks of John Stuart Mill, Grote, Bain, Lewes, and Spencer; and great as are its services to philosophy must be held to have closed. It fell brilliantly, however, for Professor Ferrier of St. Andrew's (1808-64) published in 1851 his "Institutes of Metaphysics," which is pre-eminent for clearness, liveli-

ness, elegance, and force. It is constructed on a curious plan, but rivets the attention and compels the admiration of even those who dissent from it. It was avowedly written as a sort of forlorn hope. The good work of this splendid series of thinkers is, however, not lost, though their various systems based upon that work have perished: it is incorporated with the materials of the great associational and evolutionary school led by Herbert Spencer, and serves faithfully uses for which it was never designed.

SCOTT, SIR GEORGE GILBERT, R.A., architect, born in 1811, at Gawcott, near Buckingham; his father was incumbent of that place in succession to his grandfather, the author of the well-known Commentary on the Bible. In 1835 he commenced practice as an architect in partnership with Mr. W. B. Moitart. Their first building which attracted public notice as a work of art was the Martyr's Memorial, Oxford, 1841—an elegant adaptation of the Eleanor Cross at Waltham. In 1845 they dissolved partnership. In the preceding year Scott's design was successful in a competition open to the architects of Europe for the church of St. Nicholas, Hamburg, one of the largest Gothic churches erected in Europe in the nineteenth century—a work of great richness and beauty of design, costing £150,000. Scott now took rank as the chief "Gothic" architect of the time, and no one in his day created so many important churches, or conducted the restoration of so many cathedrals and churches of note. Among the chief of his new churches may be named St. George's, Doncaster, and All Souls, Holey Hill, Halifax—rich and costly works, finished throughout with rare completeness; the cathedrals of Lumbardgh and St. John's, Newfoundland, &c. He built a great number of parish churches. Of his cathedral restorations the chief are those of Hereford—a most delicate and important work, Lily, on which he spent over £60,000; Lichfield; Ripon, cost over £52,000; Westminster, where he built the beautiful nave, north entrance, the dean's house, and other buildings on the west of the abbey; and Chichester, where he rebuilt the beautiful spire which had fallen in 1861. He worked greatly upon Salisbury, Bangor, St. David's, St. Asaph, Chester, Gloucester, Durham, Oxford, Peterborough, Worcester, Exeter, and Rochester cathedrals. He also did a large amount of work for the College of Oxford. Of parish churches he restored a very large number, and among them some of the finest and most interesting examples of our early church architecture extant. Another great work of Scott's is the new Foreign Office. Scott's original design, accepted by the ministry of Earl Derby, was for a Gothic building, but it was set aside by Lord Palmerston's ministry, and the architect was directed to make the present Italian design. The India Office was also built by Scott in conjunction with Sir Digby Wyatt, and the group was completed by the Home and Colonial Offices. Another important building of Scott's is the Town Hall, Preston, and the mighty pile of the Midland Railway Terminus and Hotel in London is another. In 1855 Scott's design for the town hall of Hamburg carried the prize against the architects of Europe, but the building was actually erected from another and less expensive design than Scott's. His imposing Albert Memorial, in Hyde Park, 1862-63, is the last successful of his greater works, but it is full of fine points. One of his last great works was the splendid pavement in mosaic which adorns Durham Cathedral. Scott frequently wrote and lectured on his art with great power. He was elected associate of the Royal Academy in 1855, and R.A. in 1860. In 1857 he received the gold medal of the Institute of British Architects, and was knighted in 1872. He died 27th March, 1878, and is buried in Westminster Abbey, an engraved brass design by his old pupil, and his successful rival in the competition for the New Law Courts (London), G. E. Street, being placed over the grave.

SCOTT, THOMAS, a celebrated Biblical commentator, was born at Baytoft, near Spilsby, in Lincolnshire, 16th February, 1747. Being determined to enter the church, he prepared himself by a course of private study, obtained ordination, and earnestly embraced the more Calvinistic doctrines of the Church of England. He soon distinguished himself by his sermons, and by some controversial works. In 1780, on the recommendation of Mr. Newton, he was made curate of Olney, and became intimate with Cowper and his friends in that neighbourhood. In 1788 he commenced his great work, the "Family Bible, with Notes." He died 16th April, 1821. His Commentary has now gone through many editions, and, though altogether superseded as a critical authority, is still reprinted both in England and America.

SCOTT, SIR WALTER, a distinguished Scottish poet and novelist, was born in College Wynd, near the Cowgate, in the Old Town of Edinburgh, on the 15th of August, 1771. His father was a Writer to the Signet, or solicitor, who looked for his son's success in the legal profession, and saw with little satisfaction his enthusiasm for old folk-lore and Scottish antiquities. "You were born for nae better than a gangrel scapae-gut," he once told him. Scott's feeble health as a boy interfered much with the ordinary routine of his studies, though hardly with his boundless desultory reading. "Never was so dull a boy," said one of the masters of the High School at Edinburgh, which he attended for five years (1779-83). Not so thought Robert Burns, who, asking a question once in an Edinburgh drawing-room as to the author of a verse of poetry, was told by a pale lame youth that it was from Langhorne. "You'll be a man yet, my lad," was Burns' approving recognition of young Walter Scott.

In 1783 Scott entered the University of Edinburgh, on leaving which he was apprenticed to his father and then studied for the bar, being admitted to the Faculty of Advocates in 1792. His progress at the bar was not brilliant, but his success as a collector of old ballads and traditional stories gained him the friendship of antiquaries and men of letters. However, he said that "literature should be a staff and not a crutch," and the office of sheriff of Selkirkshire, which he received in 1799, enabled him to carry out his theory. It was in this year that he translated Goethe's "Gotz von Berlichingen," not quite his first literary effort, as he had translated Bürger's "Lenore" and other ballads three years earlier. Meanwhile, in 1797, he was married to Miss Carpenter or Charpentier, a young lady of French extraction, with whom he lived very happily, although it is clear that there was no very profound sympathy between them, and that she was very far from being to her husband the resolute adviser and source of moral inspiration which Scott's heroines always prove to the men they love. Still she presided gracefully over his home both in the years of early obscurity as well as in those of brilliant fame; and how tenderly he came to love her is proved by the language of his diary at the time of her death. It is probable that the marriage was a step taken under the influence of reaction from the intense love which Scott had given for six years to Margaret Stuart Belcher, who then married a wealthy banker. We cannot adequately understand Scott unless we realize this great tragedy of his life, which stirred his nature to its very depths. It is this which makes marriage such a secondary element in his novels; which leads him to leave Flora MacIvor, Minna Troil, and Rebecca the Jewess unmarried, against the inclination of so many readers, and which indeed casts a sombre shadow over all his great works of fiction.

Scott began original literary work by composing some ballads—"Glenfinlas," "The Eve of St. John," and the "Gray Brother" (1800), and by preparing a collection of the "Minstrelsy of the Scottish Border" (1802-1803). In 1805 he published the "Lay of the Last Minstrel,"

which had an extraordinary popularity. But almost at the moment when a great career opened before him he laid the foundation of ultimate disaster, by becoming the sleeping partner in printing and publishing businesses conducted by two brothers, James and John Ballantyne. Partly to give these firms employment, and partly from genuine enthusiasm, he published, between 1806 and 1814, magnificent editions of Dryden and Swift, with valuable biographies attached. A reprint of the edition of Swift still holds the field. In 1808 appeared "Marmion," his greatest poem, followed by "The Lady of the Lake" (1810), "The Vision of Don Roderick" (1811), "Rokeby" (1813), and "The Bridal of Triermain" (1813). In 1814 appeared, anonymously, his first great novel, "Waverley." It is a popular error to suppose that Scott turned to fiction because he felt that Byron was superseding him as a poet. The year after "Waverley" he published yet another poem, "The Lord of the Isles." "Waverley" itself was commenced in 1806, and thrown on one side because a friend had condemned it. Scott found the opening chapters in an old desk, and completed the tale in four weeks. "Guy Mannering" was published in 1815, as were also "Paul's Letters to his Kinsfolk," and "The Field of Waterloo." From this time novel after novel issued from his pen in a manner which to his contemporaries was absolutely astonishing, and which to us is less so only so far as mere quantity is concerned. It is when we consider the distance of ages, and the variety of country with which the writer deals, that we see the gulf which separates Scott from the prolific writers of our own day. At one moment we are with the Plantagenets, at another with the Stuarts, now we are at the court of Elizabeth, and then with Rob Roy Macgregor in the Scottish Highlands. Scott concealed the authorship, partly because he thought that novel-writing was beneath the dignity of an advocate, and partly because he rightly anticipated that the element of mystery would enhance their value with the public. "The Great Unknown" was the name by which the writer was universally spoken of, and this title clung to Scott long after he had acknowledged himself to be the author of "Waverley." In 1816 appeared the "Antiquary," followed by "Old Mortality" (1816), "The Black Dwarf" (1816), "Harold the Dauntless" (1817), "The Heart of Midlothian" (1818), "Rob Roy" (1818), "The Bride of Lammermoor" (1819), "The Legend of Montrose" (1819), "Ivanhoe" (1820), "The Monastery" (1820), "The Abbot" (1820), "Kenilworth" (1821), "The Pirate" (1822), "The Fortunes of Nigel" (1822), "Peveril of the Peak" (1823), "Quentin Durward" (1823), "St. Ronan's Well" (1824), and "Redgauntlet" (1824).

It was soon after the publication of "Redgauntlet," in which novel he had introduced himself and his father, that the crash came which ruined Scott. His printing and publishing firm had been badly managed. He had recommended for publication works which were of interest to himself, but to only a select few besides, and the firm would have come to grief earlier had not Scott succeeded in borrowing. Finally, he persuaded Constable & Co. to take over the whole concern. A commercial crisis, added to Scott's ill-judged schemes, made failure inevitable, and the liabilities amounted to £117,000. There are few events in literary history better known or more deserving of honour than the way in which Scott, at the age of fifty-five, set himself to work off this enormous burden of debt. He had saved nothing, having been engaged for years in building and planting at his house at Abbotsford, it being his great ambition to found a family and leave a large estate. Time was all he asked, and this the creditors gave him, and in two years he had earned £40,000. Before his death, five years later, he had cleared off more than half the amount, and the remainder was shortly afterwards paid by his executors. The works written under these ter-

rrible conditions were: "The Betrothed" (1825), "The Talisman" (1825), "Lives of the Novelists" (1825), "Woodstock" (1826), "The Life of Napoleon" (1827), "The Two Drovers" (1827), "The Highland Widow" (1827), "The Surgeon's Daughter" (1827), "Tales of a Grandfather" (1827-30), "The Fair Maid of Perth" (1828), "Anne of Geierstein" (1829), "Letters on Demonology and Witchcraft" (1830), "A History of Scotland" (1829-30), "The Doom of Devergoil" (1830), "Count Robert of Paris" (1831) and "Castle Dangerous" (1831), the last two novels being written when their author was a paralytic patient.

In 1820 Scott was made a baronet by George IV., who was received by Scott, in Edinburgh, two years later with most effusive loyalty. In 1832 the disease of the brain from which he had long suffered, affected Scott so acutely that he was compelled to lay aside his work. The government placed one of the ships of the navy at his service, in which he cruised in the Mediterranean, and then returned home, dying at Abbotsford on the 21st of September, 1832.

The critic of Scott's poetry has to write cautiously, for it has been well said that books are medicine for the soul, and the diagnosis must be suited to the patient. To the young, the active, and one might almost say the healthy-minded, Scott's poetry has infinite fascination. To those to whom "obstinate questionings" never come, it answers almost every need. But it has none of the exquisite melody of Shelley, nor the subtle insight of Wordsworth. It was as a novelist that Scott was to show his real greatness. Here he reigns supreme with Henry Fielding, Jane Austen, and perhaps two or three Victorian writers. A great historian has charged him with demoralizing the study of history. But if he be responsible for the sins of the romantic school, to which picturesqueness is all in all, he may also be credited with having given the impulse which has brought into existence a scientific school of historians, with which the weighing of evidence is all-important. In spite of abundant anachronisms and misjudgments of character, Scott has made history—particularly feudalism—a living, breathing thing for many to whom it had previously no particular attraction.

Leaving this phase of his work we find ourselves in a world of high ideals and noble heroism, of bravery and self-devotion, and of freedom from cynicism, such as seldom in the same measure to no other novelist of the first rank. Inferior in some respects to Fielding, Jane Austen, George Eliot, and Thackeray, he surpasses them all as a delightful story-teller and as a bracing elevating influence in our lives.

When we turn from Scott the author to Scott the man, we may write with equal enthusiasm. The sense of kingship was all-potent with him. It was this which made him devote so much energy to acquiring large estates, and it was this, too, which made him so deferential to one of the least reputable of England's monarchs. When one has said this of Scott, one has said the worst. A kind father, a tender husband, a devoted friend, unspoiled by success, unmoved by disaster, few if any of our men of letters are so worthy of our reverence and admiration.

The authoritative life of Scott is by his son-in-law Lockhart, in ten volumes (1836-37)—a work of which it has been said that with Boswell's "Johnson" it makes a literary education. The eighty-four chapters of this biography were afterwards compressed by Lockhart into sixteen. But the most admirable life of Scott on a small scale is that by Richard Holt Hutton, editor of the *Spectator* newspaper, in John Morley's English Men of Letters Series (1878). The life by Dr. Robert Chambers (1871) is also interesting. For criticism of Scott, see Francis Turner Palgrave's essay in the Globe edition of his poems; Hazlitt's "Spirit of the Age;" Keble's "Occasional Papers;" Senior's "Essays in Fiction;" Masson's "Novelists and their Styles;" Jeaffre-

son's "Novels and Novelists;" Taine's "English Literature;" Leslie Stephen's "Hours in a Library;" and Carlyle's essay in his "Miscellanies." The only complete edition of Scott's works is in ninety volumes, comprising with Lockhart's Life the so-called "Hundred-volume Scott."

SCOTUS, DUNS. See DUNS SCOTUS.

SCOTUS, ERIGENA. See ERIGENA.

SCREAMER (Palamedeidae) is a family of birds belonging to the order ANSERES. They have the bill short, elevated, and curved at the tip; the wings are long, and each is armed with two powerful spurs; the toes are long, the interior united by a short membrane, and the claws are long and curved; the tail is moderate and rounded.

The Horned Screamer (*Palamedea cornuta*) is about the size of a large goose, blackish in colour, with a large red spot on each shoulder, and the belly white. Its head is armed with a long, slender, movable horn about 3 inches long. The horned screamer is a native of Brazil and Guiana. It lives in pairs in marshy ground, feeding chiefly on leaves and seeds. It can defend itself from the attack of birds of prey with the spurs on its wings. Its flight is powerful. It utters, at the slightest alarm, a very piercing cry. The nest is placed on or near the ground, and contains two eggs. The Crested Screamer (*Chauna charraria*), from Southern Brazil and Paraguay, is a little smaller, with a blackish head plumage adorned with some white spots. In place of the horn of the preceding species, there is a circle of feathers at the back of the head, which can be raised or depressed at pleasure. The crested screamer agrees in its habits with the preceding species; it is frequently domesticated by the natives, and kept with poultry to protect the latter from vultures. There is a third species from Colombia, the Bohem Screamer (*Chauna dehuana*).

SCREEN, in architecture, a term probably connected with the Latin *partitio*, a partition dividing off some portion of an interior room from the rest, without shutting up the space overhead; a screen being a partition carried up only to a certain height, so as to admit a view beyond it. Screens are exceedingly beautiful internal features in the Gothic or Pointed style, in which they were employed for a variety of purposes, not in churches alone, but in halls and other buildings.

In our cathedrals the choir is separated from the nave by the *Organ Screen*, which differs from others in being a double screen, so as to form the gallery for the organ above, and to admit of stairs leading up to it in the space between two partitions.

The *Altar Screen* serves as a back wall to the choir, separating that division of the church from the Presbytery or the Lady chapel behind it. It was therefore usually so as for the whole height to which it was carried up. That erected by Bishop Fox in Winchester Cathedral is a splendid stone screen decorated with several tiers of canopied niches. The fronts of chantries, small chapels, &c., in churches, may also be described as screens, as, for example, that enclosing the monumental chapel of Prince Arthur, son of Henry VIII., in Worcester Cathedral. The tomb of Henry VIII., in his chapel at Westminster, is a very gorgeous piece of screen work, executed entirely in metal, and forming an insulated shrine on a very large scale. Westminster Abbey contains many fine studies of screens in its chapels and chantries.

SCREW. The mechanical power called a screw essentially consists of a spiral thread revolving round a cylinder, and combines within itself the properties of the lever and the inclined plane.

It may be philosophically constructed by imagining first an *isosceles triangle*, ABC (fig. 1, Plate), to turn round the axis, AZ , generating two conic frustums united by their larger ends; and next letting this triangle, while rotating, have a regular motion towards Z , so that after

rotation the point B shall be at A , and the triangle ABC at $A'B'C'$, and so on; then we get a convex, exterior, or male screw, the height AB being the distance of the threads. The corresponding concave, interior, or female screw is shown by the polygon $AC'B'S$, considered as a solid. Another form, generated by a rectangle, not a triangle, is shown at fig. 2. In some cases the convex screw, A , is fixed, as in fig. 4, while the concave screw, E , turns, worked by the handle CD , but in most cases the reverse action occurs. The curve, any point x (fig. 1), describes in moving round AZ , is obviously traced on the surface of a right cylinder, whose axis is AZ and the radius of its base AX . If we develop this, as in fig. 3, then dc is the circumference, which has AX (fig. 1) for its radius, and the perpendicular bc represents the distance of the thread, as AB (fig. 1); db is seen to be a straight line, and af , the line of the second rotation, is of course exactly parallel to it; and so on. From this figure a simple mathematical calculation shows that there will be equilibrium in the use of a screw when the power applied has the same ratio to the resistance as the "distance of the threads" has to the circumference described by one rotation of the power. Thus, with the *endless screw* (or "perpetual screw") at fig. 5, driving the wheel, ED , we have, for a state of equilibrium,

$$P \text{ (the power)} \times AB \times \text{radius of } ED = \\ W \text{ (the resistance)} \times \text{distance of threads} \times \text{radius of axle.}$$

The *differential screw* ("double screw," shown in fig. 6) has been the parent of much improvement in the economical and more accurate application of the power of the screw. Let AB be a plate of metal, in which the screw CD plays, having, say, ten threads to the inch. This screw is hollow, and its interior carries a female screw of eleven threads to the inch, the corresponding male screw being shown at ED , and the latter is controlled by the frame FG , which prevents it from turning. Now, when the screw CD is turned by means of the handle K , ten times, it will have advanced an inch, and if DE were free the point E would have advanced an inch; but DE is not free, and the effect is as if it had been advanced an inch and then screwed back by ten rotations. As it has eleven threads to the inch, it is thus screwed back $10/11$ ths of an inch, that is to say, the point E has advanced $1/11$ th of an inch for ten rotations of the handle K , and the screw CD ; and that is further to say, that for one rotation it would advance $1/110$ th of an inch. To get this accuracy by means of one screw of 110 threads to the inch would be impossible, as such thin threads would bear no pressure. The power gained is enormous. Taking the figures as given, and the handle as 6 inches long, we get, in the case of equilibrium, P (the power) is to W (the weight or resistance) as 1 is to $110 \times 6 \times 2\pi$, that is to say, as 1 is to 4146.912. A force of 1 lb. thus balances a force of nearly 4147 lbs. The movement is very slow, it is observed, for it takes, under the circumstances given, 110 turns to advance an inch.

Manufacture of Screws.—In the infancy of screw-making the thread was formed with a file, but this process has long since been superseded by the use of dies and cutters. The cutting of the worm of large screws, made singly, is performed in a lathe, the blank being fixed in a chuck, and projecting during its revolution between a pair of stationary cutters; the longitudinal motion of the blank, and consequently the size or inclination of the thread, being determined by a regulating or pattern screw attached to the mandril, which must therefore be changed for every different degree of fineness; while the shape of the thread or worm depends on the form and position of the cutters. In some cases of coarse, large screws, the thread of the screw is crushed in upon the rod of metal, in the same way that the device of a coin is crushed in upon the metal blanks, by immense pressure.

At Birmingham, the great screw-making centre, all sizes of the ordinary screws used in carpentry and cabinet-making are made of iron-wire chopped into lengths, and shaped in a series of self-acting machines. A blow on one end forms a head, which is speedily turned true in a revolving chuck; the nick is cut by a small circular saw; a revolving jaw then seizes the head, and the "worm" or screw is turned in a twinkling, and in this way half a million screws an hour are produced. One of the great screwing-sheds alone covers nearly an acre and a half, and contains 2000 machines. These being self-acting, five or six can be kept going by one woman.

In cutting screws in wood an internal wooden screw is cut by an external screw of iron or steel, and an external wooden screw by an internal screw of iron or steel, the cutter or *tap* being shaped according to the kind of screw to be produced.

SCREW OF ARCHIMEDES. The inventor of this machine is quite unknown, but both Diodorus Siculus and Athenæus ascribe it to the philosopher of Syracuse. For an account of it see the article (and Plate II.) **HYDRAULICS.**

SCREW-PROPELLER, THE, an instrument for the propulsion of vessels, consisting of two or more oblique blades, set on a shaft lying nearly parallel to the keel, and revolving beneath the water at the stern. The screw blades as they sweep round drive a stream of water astern; and the reaction of that water produces a forward pressure, which, being transmitted through the shaft to the vessel, overcomes the resistance of the water to her motion, and drives her ahead.

History.—The screw propeller, like the windmill, which it resembles, belongs to a remote antiquity; the Chinese said to have used screw propellers from a very early date as a means of sculling vessels.

Passing over various devices suggested by Du Quet in 1731; by Bouguer, in 1746; by Daniel Bernoulli, in 1752; and Emerson, in 1754—all based upon the same principle as the modern screw-propeller—we come to an application of the Archimedean screw, invented by M. Poncelet in 1768. He proposed that a "ptérophore," composed of the circumvolution of the thread of a screw round a cylinder, should be placed on each side of a vessel to propel her through the water, or only at the fore part. This screw might be either wholly or partially immersed. Bushnell, an American, in 1776, devised a submarine vessel, which was to be raised or lowered in the water by means of an inclined blade or one fastened to the top and operating like a screw, while propelled backward or forward by another similar blade attached to the bow. This vessel was to carry a powder magazine, which, secured to the bottom of an enemy's ship, would, it was supposed, destroy her by its explosion.

In 1784 Joseph Bramah, an eminent London engineer, patented an invention for propelling vessels by a wheel furnished with inclined fans or wings, similar to the vertical sails of a windmill. This was to be attached to an axis passing out of the vessel's stern, and was to revolve beneath the water with a stuffing-box or proper packing inclosing the shaft where it pierced the vessel to prevent the water from entering. Lytleton, a London merchant, in 1794 proposed what he called an "aquatic propeller," consisting of a single convolution of a three-threaded screw

In 1799 Dr. Shorter, an English mechanic, obtained a patent for a "perpetual sculling machine," which consisted of a screw immersed in the water at the vessel's stern. This contrivance was successfully applied to the propulsion of a large vessel by manual labour about 1800; but the speed attained was very small; and as the steam-engine had not yet been practically applied to navigation, Shorter's invention was of no practical value—a motive power was wanted. When Watt's engine was first applied to the pro-

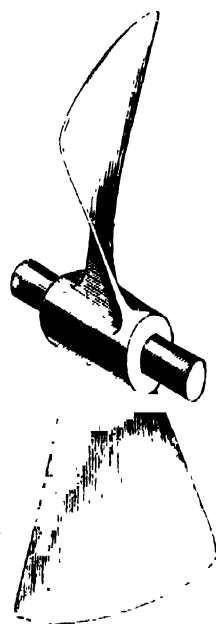
pulsion of ships it was in connection with paddle-wheels, and the screw-propeller was not practically introduced on a great scale until 1836, when Mr. F. P. Smith, an Englishman, and Captain Ericsson, an American, independently applied it in somewhat different forms to steam vessels, which proved successful when tried.

The British admiral had refused to adopt the screw; but the success of the *Archimedes*, a vessel of 230 tons and 80 horse-power, built in 1810, induced them to make trial of this new mode of propulsion. Various experiments were instituted, which conclusively established the superiority of the screw to the paddle-wheel in vessels of war. It was obviously protected from injury by the enemy's shot, owing to its entire submersion and the low position of the engines in the ship. It is now, therefore, the species of propeller almost universally adopted in the British navy, while it is also employed, as an auxiliary or independently, in merchant vessels. Paddles, however, are still used for many passenger steamers in which great steadiness is required.

Form of Construction.—To enumerate the various modifications of screw which have been introduced would far exceed the limited space at our disposal. In this country vessels are generally fitted with screws of a uniform pitch, formed with either two or three, but sometimes with four arms, of the form shown in the cut, having the arms attached to a cylinder, and sometimes having them attached to a sphere. One advantage of having an even number of arms, such as two or four to a screw, is that there is less vibration. Every time a screw blade passes the stern-post a shock is communicated to the vessel, but when two blades pass simultaneously in opposite directions the two shocks tend to counteract each other's effects.

Position.—The screw-propeller is usually set in a hole or opening in the dead-wood behind the stern-post, and before the rudder-post. It is sometimes suspended on a short shaft, carried by a metal frame with a rack on each side, and in these racks endless screws work, which, when put into motion, raise the frame, lifting the propeller out of the water when required to act only occasionally, in which case it is called an auxiliary screw. Such a screw cannot have more than two blades or arms. In some cases, where very large and heavy screws are required, the hydraulic press has been introduced for raising them.

The screw-shaft, at the point where it passes through the stern of the vessel, is kept tight by passing through a long pipe called the shaft-pipe, fitted closely into the ship's hull, and bored at and near the ends so as to fit accurately the propeller-shaft. The forward end of the pipe passes through a water-tight bulkhead and contains a stuffing-box. In some vessels the throat of the propeller shaft in diving ahead is communicated to the ship by means of a flat steel pivot at the forward end of the shaft pressing against a stop. In driving astern the throat is exerted through a pivot at the after end of the shaft against a stop in the rudder-post. More commonly the throat of the shaft, whether exerted ahead or astern, is communicated to the ship through a journal about twice as long as the diameter of the shaft, and having a number of collars projecting from it which fit into corresponding circular grooves in a bronze



bush that embraces the journal. The bush is carried by a strong plumper-block, securely framed to the bottom of the ship.

Twin-screw Vessels.—Vessels have been constructed with a screw under each quarter. This plan has the advantage that the necessary propelling area may be got at a lower depth, while by turning one screw ahead and the other astern, the vessel may be turned as on a pivot, without any aid from the rudder. In most cases the screw shaft protrudes through the oblique run of the ship on each side, and its outer end is supported by a suitable wrought-iron frame, while the rudder is set in the usual place. For war purposes double screws present many advantages. They afford more power of rapid evolution; by being more sunk in the water, they are more out of the reach of shot, and the vessel will not be wholly disabled if the rudder or one of the screws should be damaged or destroyed.

(For further particulars see Woodenoff's "History of Steam Navigation," and the elaborate "Treatise on the Screw Propeller," by John Bourne, C.E., London.)

SCRIBES (Heb. *sopherim*, those occupied with books), in the earlier periods of the history of Israel, were officers of the king, (1 as we should say, secretaries of state (2 Sam. viii. 17; xx. 25; 2 Kings xxii. 3). At a later period the term was applied to those men whose work it was to transcribe old records, or to put in writing what had been handed down orally (Prov. xxv. 1), and during and after the exile it became the special title of those who copied the sacred writings and studied their interpretation. As the people became established after the return from Babylon, and the law obtained greater reverence, the office of scribe rose in importance, and those who sustained it were held in high honour. The title was borne by Ezra, and the ideal of the office is given in Ezra vii. 10. In the period from B.C. 200 to the destruction of the Jewish state, the scribes formed a kind of guild or brotherhood, entrance to which was gained by a long period of study in the school of some recognized teacher of the fraternity. The candidate after passing through his period of scholarship was made a "companion," and finally admitted full member by a public ceremony in the synagogue. It was the duty of the scribe to perform the rite of circumcision, to act as schoolmaster, to draw up marriage settlements, and prepare deeds for purchases and sales, loans and agreements, &c. He was a member of the local court of justice connected with the synagogue, and in his private capacity was often elected arbitrator in cases of dispute. His chief duty, however, was to study and expound the sacred law, and to retain in his memory as many of the decisions of its eminent teachers as possible, so as to be able to decide as to what was lawful or unlawful in matters of conduct. Shortly before the time of Jesus the word *RABBI* came into use in addressing them, and this term afterwards became the regular title of the brotherhood.

SCRIP is a contraction of the word "subscription" used on the Stock Exchange. People who "subscribe" for certain portions of a new loan, receive an allotment-letter directing them either to put of the amount applied for, and the allotment-letter is shortly afterwards exchanged for "scrip" of like amount, entitling the holder to so many bonds or shares as soon as the latter are ready for issue and as soon as the subscriber has complied with the terms, if any, upon the scrip, as to proportional payments on certain dates, &c.

SCROFULA is the name given to a constitutional condition generally inherited, the evils of which are intensified by defective nutrition and unsanitary surroundings in early life. Persons who manifest a tendency to this disease are sometimes called "strumous," and the old English name, "the king's evil," is still occasionally applied in country districts to some of the manifestations of the

disease. Where the condition of scrofulosis is inherited the symptoms of the disease generally become manifest during childhood. Among the more prominent of these is a liability to enlargement of the lymphatic glands from slight causes, or from no obvious cause. The glands under the jaw and at the side of the neck are very liable to enlarge, and this enlargement may be so great as to cause serious deformity, while in many cases the swelling proceeds to suppuration, and after a slow and difficult healing an unsightly and permanent scar is left behind. Scrofulous persons are also very liable to inflammation of the eyes and of the eyelids, to numerous diseases of the skin, to a peculiar inflammation of the various mucous membranes, to serious derangements of the digestive functions, and to chronic inflammation of the joints attended by discharge of matter and disease of the bone. Lastly, the lungs, kidneys, and testicles may be the seat of primitive strumous disease.

Of the intimate nature of this affection very little is known, and in spite of all the discoveries of modern times but little more can be said than that it is a special form of constitutional weakness, debility, or degeneracy of mankind. In the first instance it seems to arise from any of the numerous causes which lessen health and strength and lower the tone of vitality, and once produced the disease is highly hereditary. The latter fact should be borne in mind by those who contemplate marriage, more especially when the persons belong to related families.

With respect to the treatment of scrofula the old English name we have alluded to refers to an old superstition that the disease was curable by virtue of the royal touch. The practice of touching those affected is said to date from the time of Edward the Confessor, and it was continued as late as the reign of Queen Anne, Dr. Johnson being one of the persons touched by the latter sovereign. A similar custom prevailed in France; and miraculous powers for the cure of scrofula were likewise claimed for sundry saints, for the heads of certain noble families, for a seventh son, and for many consecrated springs. The office for this ceremony was retained in the Liturgy until 1719, since which it has been silently omitted.

In modern practice the treatment of scrofula naturally divides itself into the preventive and the curative, the former of which is the more generally successful and obviously the more important, and for which the great means are nutritious diet, pure air, warm clothing, and proper exercise. Where children are born with the constitutional tendency towards scrofula they should be carefully nourished, kept scrupulously clean, and allowed to spend as much time as possible in the open air. The medicines which have the greatest value are cod-liver oil, iodine, iron, and sulphur in the form of sulphide of potassium or liver of sulphur. Glandular enlargements, until they suppurate, are best treated by hot fomentations, and it is generally better to favour the outward discharge of matter than to strive to promote its absorption. Inflammation of the eyes may, in mild cases, be successfully treated by keeping them carefully cleansed of the discharge by warm fomentation, the use of a shade or veil, and the application of a simple ointment to the eyelids. The more serious symptoms of the affection will require special treatment, which must be adapted to the circumstances of each particular case.

SCROPHULARIACEÆ is an order of plants belonging to the *GAMOPETALÆ*. The species are very widely diffused over the surface of the earth, being found in the whole range of climate between the coldest point at which vegetation occurs at the poles, and the hottest parts of the tropics. In the torrid zone of both worlds they are very abundant, and form a twenty-sixth part of the flowering plants of Europe and a thirty-sixth of those of North America. In Australia and New Zealand they are common, and the barren shores of Tierra del Fuego

produce several species. Scrophulariaceæ are in general suspicious plants. Several of them are active poisons, and though all do not possess deleterious properties, they are all more or less acrid. Some are esculent, but they require great caution in their preparation as food. Many of the species are used in medicine. *Digitalis purpurea* (purple foxglove) is a powerful sedative poison, and is a valuable remedy in some diseases. *Gratiola officinalis* (the hedge hyssop) is also an active medicine, being purgative and emetic. *Scrophularia peregrina* (figwort) is the *gallopsia* of Dioscorides. *Scrophularia nodosa* has leaves which, when bruised, are said to be purgative and emetic. They have a bitter taste and a disagreeable smell. It is native mostly throughout Europe. *Scrophularia aquatica* is called water betony, bishop's leaves, and broadwort. Its medicinal properties are the same as those of *Scrophularia nodosa*. There are several cultivated flowering herbs in this order, e.g. the Snap-dragon (*Antirrhinum majus*), Musk (*Mimulus moschatus*), species of Veronica, Pentstemon, Calceolaria, and Linaria.

In this order the calyx is persistent, three to five toothed; the corolla is irregular, personate, five-lobed, or four-lobed from the coherence of the two posterior lobes; there are two or four didynamous stamens, rarely five; the ovary is superior, two-celled, with axile placentas, bearing numerous ovules; the seeds are perispermic, which is a good mark of distinction between this order and Bignoniaceæ and Acanthaceæ.

SCRUPLE (Lat. *scrupulum*, diminutive of *scrupus*, a pebble, such as was probably used in counting), the third part of a drachm, or the twenty-fourth part of an ounce, in the apothecaries' division of the Troy pound. The term served originally as the twenty-fourth part of the Roman *uncia*; afterwards as the sixtieth part of an hour, or what is now called the minute. The sixtieth part of a minute was called *scrupulum secundum*, the sixtieth part of a *scrupulum secundum* was *scrupulum tertium*, &c., whence our term second, third, &c., applied to the sexagesimal divisions of the minute. Strictly the *scrupulum* was a small sharp pebble, such as often found its way between the sandal and the foot, whence the use of the word to denote a difficulty or objection.

SCRUPULUM was the name of the smallest gold coin of the ancient Roman Republic: it was a third of the gold denarius. Specimens are shown on Plate II. COINS.

SCRUTIN DE LISTE, a mode of voting by ballot at the elections for the Chamber of Deputies in France, used in the elections of 1848, 1849, 1871, and 1875, and proposed again in 1881 (with the warm support of M. Gambetta), accepted by the Chamber of Deputies, but rejected by the Senate. In *scrutin de liste*, the country being divided into departments, the number of members is fixed for each department in proportion to its population, and each elector writes on his paper as many names as there are persons to be elected. In *scrutin d'arrondissement* the country is divided into smaller districts, and each elector votes for only one person to represent that district. The chief objection against *scrutin d'arrondissement*, when compared with *scrutin de liste*, is that in that mode of voting political considerations are likely, especially in rural districts, to be subordinated to local interests and influence; but it is naturally preferred by Conservatives, because the rural districts are more conservative than the towns, while, on the other hand, *scrutin de liste* is favoured by the Radicals, because, under that mode of voting, the towns would have the preponderance, and the Radicals are in the majority in the towns. Under the empire the republicans set up *scrutin de liste* as unfavourable to the empire; under the republic, moderate Republicans prefer *scrutin d'arrondissement* as unfavourable to the Radicals. Voting by *scrutin de liste* was introduced in the electoral system of Italy in 1882.

SCUDÉRY, MADELEINE DE, sister of Georges de Scudéry, the dramatist (1601–67), was born at Havre in 1607. She is the authoress of several voluminous romances which had an extraordinary reputation, and of which we may name as the principal, "Ibrahim, ou l'Illustre Bassa;" "Artamène, ou le Grand Cyrus;" "Clélie, Histoire Romaine;" "Almahide, ou l'Esclave Reine." She also wrote a great number of *vers de société*, addressed to her contemporaries; and moral conversations. She was an accomplished leader of her *coterie*, an acute critic on art, and a consummate housewife, as well as somewhat of a bluestocking.

Mademoiselle de Scudéry died 2nd June, 1701, at the advanced age of ninety-four.

SCUDO (Lat. *scutum*, a shield, because of the heraldic shields of arms borne as devices by the coins of the respective rulers), an old Italian name for a crown-piece. It is by origin the equivalent of the French word *écu*. Of these the chief were the following:—

Roman scudo, the old Papal States unit of value, equal to 4s. 3d. English, and containing 10 Pauls or 100 Baiocchi. But the present scudo of the kingdom of Italy is simply a five lira piece, worth nearly 4s. English. The *Austrian scudo* was equal in value to the old Papal scudo. The *Neapolitan scudo* was worth rather less, about 4s. only; and this was also the value of the small gold coin of Genoa, the familiar *scudo d'oro*.

SCULPTOR, the recognized contraction for *Apparatus Sculptoris* (sculptor's easel), one of Lacaille's southern constellations. See PLATE CONSTELLATIONS, southern hemisphere, on the equinoctial colure, midway between XXIV. and the pole.

SCULPTURE (Lat. *sculpsere*, to carve or cut), the art which teaches the imitation of objects in their real appearance by means of solid form, distinguished from drawing and painting, which attain this by lines and colour. Sculpture employs various means and processes (such as carving, chasing, modelling, hammering or beating out, casting, and gem engraving), and many different materials such as clay, stucco, plaster, and wax, for modelling; marble (white, and of various colours), alabaster, basalt, porphyry, granite, and other kinds of stone, as well as ivory, bone, and wood, for carving; and wax, plaster, bronze, and other kinds of metal for casting. It likewise makes use of several different modes of representation. The first of these is technically termed "in the round," in which insulated objects, consisting either of single figures or groups, such as the "Apollo Belvedere," or the group of the "Laokoön" (Plate V.), are shown; while the second is where the objects are in relief, or attached to a background, like the figures in the metopes and frieze of the Parthenon. The term *alto-rilievo*, or high relief, is used by modern writers and artists to denote objects standing boldly out, and but slightly attached to the background; the term *basso-rilievo*, or low relief, to denote those flat in treatment and close to the background; and *mezzo-rilievo*, or middle relief, to denote a mode of execution between these two extremes. The Egyptians used yet another form of *rilievo*, often called "sunk relief," where the object, though in itself in relief, is sunk as a whole till its most prominent parts only reach the level of the unsculptured surface, the deepest cut being round the outside outline, in consequence. The opposite method to *rilievo* is *intaglio*, the most familiar example of which is the ordinary signet-seal. This method is largely used for the sculpture of gems and precious stones.

In ancient times colour was largely used in sculpture. All Egyptian sculpture is highly coloured after nature, though in a strictly conventional fashion. So far as we know, Greek sculpture of the great epoch was not coloured but the gold and ivory statues went some way towards it. Both the earlier and later Greek sculpture certainly was

sometimes, perhaps often, coloured; and specimens exist showing that the hair was gilt. The rude wooden and stone effigies of the middle ages were almost always coloured. A purer taste has now returned, and when Gibson exhibited his tinted Venus in 1862 he was almost universally condemned.

Of the process of sculpture in marble scarcely anything need be said beyond the fact that although the greatest men of the past (including Michelangelo) are known to have sometimes worked directly on the block, modern sculptors invariably work from the model. This is prepared in clay very exactly, and is precisely like the proposed statue. A plaster cast is then taken. The assistant sculptor (*scarpellino*) then measures the model or cast with most scrupulous accuracy, and drills numerous holes all over the block of marble, each one as deep as will come nearly to the surface of the future statue at that point; this is called *pointing*. He next roughly hacks down the block to these points thus prepared. The master sculptor then takes the work in hand and finishes it. A head and-shoulders statue is called a *Bust*; a mutilated statue which has lost the head and some or all of the limbs is called a *Torso*.

Egyptian Sculpture dates from the vast period of 1000 years ago in its earliest remains. Simplicity of design, colossal size, great breadth of treatment, exclusion of minute details, and unchangeableness of type were the chief characteristics of Egyptian sculpture. (See Plate I. figs. 5, 6; Plate II. fig. 3.) We may trace the advance of Greek sculpture from the rude hints of the Pelasgi to the finished splendour of the Parthenon, and from the wooden images of Daedalus to the Olympian Zeus of Phidias. But in the long procession of Egyptian statues, whose series extends for fifteen centuries—from the days of the early Pharaohs to those of the later Ptolemies—we see nothing but the same figure constantly reproduced under the same features, covered with the same symbols, accompanied by the same attributes, executed in wood or stone, in red or gray granite, sculptured or painted, and more frequently both, on a large or small scale, from upwards of 70 feet to 6 inches, varying but a little in the quality of the execution, according to the nature of the material and the hand that wrought it, so that throughout the vast field of imitation, material, proportion, and subject, on which Egyptian art has exercised itself, we behold in reality but one type for each individual. This unchangeableness of Egyptian sculpture is faintly paralleled by what takes place at the present day wherever the rule of caste is established—as in India and in China, where paintings and sculptures, executed many centuries ago, seem to have come from the same hand as those which are executed at the present day. There is in those countries but one model, a sort of traditional pattern, which is ever repeated, is rarely improved, and never altered. And further, Egyptian artists were deprived of a study the most essential to drawing, namely, the knowledge of the structure of the human body; for anatomy was prohibited in Egypt, in consequence of the religious respect for the dead body, which not only prevented them from allowing its dissection, but also arranged that after the single incision made in the side of a corpse to extract the intestines and perform the embalmment, the *paraschistos*, or man intrusted by the state with that operation, at once necessary and sacrilegious, immediately took to flight in order to save his life from the customary and regulated resentment of the relations of the deceased, who were considered bound to pursue him with stones. The characteristic “sunk relief” of Egyptian bas-reliefs and hieroglyphics is as remarkable and as invariable in style as the statues in the round.

Assyrian Sculpture vies with Egyptian in its hoar antiquity; and the bas-reliefs, to which it is almost confined, resemble those of Egypt in many particulars. Also like

Egypt, Assyria is fond of man-headed bulls and other such monsters. The collections of the British Museum are so well known and accessible as to render this period of art familiar to Englishmen. The first great difference from the wall sculptures of Egypt is seen in the absence of “sunk relief” in the Assyrian remains, and the second in their greater variety and vigour. The same ignorance of perspective is betrayed: fishes swim on top of the water, boats are piled on top of one another, the king is frequently shown on a large scale, and his subjects or enemies (in the same picture) on a very much smaller scale, &c. Nevertheless the events are depicted with fidelity and accuracy. Single Assyrian statues or figures are as yet rare, but no one can predict what may come to light on further exploration of the remains of this artistic, cultured, and progressive people.

Persepolitan Sculpture.—The ancient Persians in their greatest epoch (521–467 B.C.) followed Assyrian models, with modernizations. Warlike scenes are avoided, dignity is aimed at. Xerxes or Darius are shown as seated, receiving the homage and presents of ambassadors and subjects, &c. The animals are better drawn, the drapery more flowing; and the same influences are at work as those which moulded Greece. See Plate I. fig. 1; and Plate II. fig. 2.

The Etruscan School of Sculpture is the next that demands notice in the history of the art. Etruscan sculpture possesses a fixed and marked type, owing to the existence of causes similar to those which operated in Assyria and Egypt. The “*Lucumones*,” who bore rule in Etruria, were priests as well as kings, and certain forms and types were consecrated in Etruria as in Egypt, and not permitted to be departed from. But the Etruscan type was totally different from the Egyptian. A bony, robust, vigorously developed system, muscles strongly marked, powerful forms, attitudes generally strained, an execution often too marked and hard, exaggerated movement and expression, and too great abundance and prominence of anatomical details, these are the chief characteristics of the original productions of the Etruscan style, which differs materially both from Egyptian and Greek art. See Plate I. figs. 3, 4.

Greek Sculpture.—We now come to the consideration of Greek sculpture, the greatest, most brilliant, and most influential school of sculpture that the world has ever seen. (For specimens, see Plate I. fig. 2; Plate II, figs. 1, 4, 5, 6; Plates III., IV., V., and VI.) It was the Greek mind that first perceived the possibility of the development and exaltation of sculpture from a mere symbolical into an imitative art; and though at first, and for a long period, the influence of the priesthood, as in Assyria and Egypt, had the effect of cramping and fettering the efforts of Greek genius, these fetters were at length burst asunder, and from that moment to the culminating point of Greek art, in the era of Periklēs, the onward and upward progress of sculpture was rapid and continuous. It was the intense sensibility to beauty, the unbounded admiration for it wherever it was met, the exquisite enjoyment and appreciation of it in the Greek mind, joined to fortunate circumstances of climate and habits, the abundance of fine naked forms which the public games constantly presented to the eye, and the wise and liberal encouragement given to the artists by the government, that combined to raise sculpture in Greece to a height of excellence it had never reached before and has never since attained. Art in Greece, and in the Greek colonies of Asia Minor and Magna Græcia—as Southern Italy and Sicily were termed—presents four well-marked periods: the first, comprehending the archaic, extending from the earliest history of the nation to the time of the Persian wars, 490 B.C.; the second extending from that date to the perfection of sculpture by Phidias, his scholars, and contemporaries, 400 B.C.; the third from 400 B.C., the

period of the supremacy of Athens, to 320 B.C., the period of the supremacy of Sparta, during which the less severe design, more refined execution, and more voluptuous forms of Praxiteles, Lysippos, and their scholars and followers, effected a great revolution in the practice of sculpture; and the fourth and last period, to the fall of Greece in 146 B.C., marked by the decay of true Greek sculpture under slavish imitators or rash innovators.

From the period of Daidalos, the reputed founder of Greek sculpture and author of numerous shapeless old images referred to in Greek literature, though now all lost—that is, from what we may call the mythological period of Greek art—down to the ninth century before our era, there is almost an entire absence of any certain information about sculpture. About the ninth century B.C., however, or the age of Peisistratos, sculpture in Greece began to advance; and it may be observed that the development and perfection of art among the Greeks coincides in a remarkable way with the period of their highest civilization, their most perfect social organization, and their most heroic achievements. The custom of erecting statues to victorious athletes, which was established from the fiftieth to the sixtieth Olympiad, was strongly in favour of the improvement of art and its complete emancipation from certain consecrated usages, which had previously hindered its free development. It was real portraits, not mere hieratic models or conventional types, that were required to perpetuate the memory of these victorious athletes, in whom nature and training had combined every physical advantage, and who were the pride of their native towns and of all Greece. The imitation of nature, and of select nature, became thenceforth the great living principle and chief aim of art, and it was promoted by the study of the nude, which was an essential condition of art among the Greeks, whose statues of gods, demi-gods, heroes, athletes, &c., were either represented naked or with a very slight amount of drapery. The most lovely women were proud of becoming the models of famous sculptors and painters. The beautiful Elpinikhê, the sister of Kimôn, did not disdain to sit to Polignôtes, even when her brother was the head of Greece and the vanquisher of Persia; and the citizens of Crotona assembled the flower of their maidens before Neuxis, in order that he might select from among them those best fitted to assist him in his famous picture of Helen. This supreme law of beauty, impressed on the hearts of the people and imposed upon art, must therefore be considered as one of the principal causes which led to the perfection of Greek sculpture, which is never allowed to be marred, either in feature or form, by any expression which would injure the beauty of either. Anger, rage, fury, despair, carried to that excess which disfigures the human countenance or distorts the human frame, are never allowed to profane the beautiful productions of the highest period of Greek art, although it frequently exhibits the most violent passions and the most pathetic subjects.

We may shortly notice some of the principal schools and artists of the first or archaic period of Greek sculpture. Of these schools the most famous were those of Sicily, Sicily, Ægina, and Corinth. To this period belong the lions still standing over the gateway at Mycenæ, which are supposed to be the oldest existing example of Greek sculpture, along with the Ægina marbles, now preserved at Munich, the Lycian remains in the British Museum, and the sculptures from the two temples at Selinus discovered in 1828. The Selinuntine sculptures, from a Sicilian Greek temple, preserved at Palermo, are chiefly metopes, of limestone, with figures in very high relief (Plate III.) They are at once seen to be of far higher antiquity than those of Ægina (Plate IV.) The first show no faces in profile, though the body may be turned, and two shoulders, two eyes, two feet (in profile), &c., are as imperative as

among the North American Indians of our time, where it will be remembered Catlin ran a very narrow risk on the charge of "robbing the braves of half their face," i.e. drawing them in profile. The subjects of Amazons conquering giants by the help of their goddess, while the Sicilian heroes conquer the Amazons in their turn, and carry them away on their shoulders, bound hand and foot, are of equal rude brutality with the half-savage handiwork. The conventional smile of nearly all the heads is very monotonous and inexpressive (see also Plate II. figs. 4, 5). Many of these sculptures have much colour remaining. Their date is about 650 B.C. The Xanthos sculptures (Lycian room, British Museum) are roughly coeval, but are better in design.

A full century later come the famous archaic Æginian sculptures (see Plate II. fig. 1, and Plate IV.) These were discovered in the year 1811; and nearly seventeen perfect statues exist, all belonging to the temple of Athênâ in the island of Ægina, off Athens. The original statues, restored by Thorwaldsen, are all at Munich. They are of Parian marble, and are so carefully executed as even to show wrinkles on the flesh. The limbs are delicately moulded and full of energy, the attitude graceful and expressive, but the heads are still of Eastern type, reminding us of the Assyrian school—the chins are sharp, and the eyes oblique. But the sideways feet, the sickly smile, are now only found in sculptures of the goddess herself; and it is, of course, admitted that sacred art is always slower to move than secular art, even when, as here, the latter is applied to temple use. The goddess who has been long prayed to, as in Plate IV. fig. 1, might be supposed to be offended if her effigy was changed; and thus the very persistence of the archaic type lends sacredness to it.

We now proceed to the greatest period of Greek sculpture, of which the central figure and presiding genius was the immortal Phidias. The chief names belonging to this period are Hegesias, Muron, Puthagoras, Pheidias, Poluklêtos, and Alkamênês, who erected sculpture in the highest development it has yet attained by introducing a far nobler and truer standard of form. Puthagoras is said to have been the first sculptor who expressed the veins and treated the hair with grace and delicacy. Muron, along with Pheidias and Poluklêtos, was a pupil of Ageladas, and he and Poluklêtos were rivals in bronze statuary. The renowned "Diskobolos" (quoit-player) of Muron is shown on Plate VI. This artist excelled in exhibiting violent action. Poluklêtos of Argos was one of the greatest sculptors of antiquity, and was especially famous as the author of a lance-bearer ("Doruphoros") whose proportions were so perfect that it was generally accepted as a canon or rule of art. Alkamênês was also a sculptor of high distinction, and is believed to have materially assisted in the sculptures of the Parthenon. It is thought by many authoritative critics that the crown of all sculpture, if not of all art, the Aphrodite found in the island of Melos in 1820 ("Venus of Milo"), now in the Louvre, is a copy of a statue by Alkamênês, who was a pupil and constant assistant of Pheidias. Also the "Apollo Belvedere" is often claimed to be a late copy of an original by Alkamênês. Agorikritos and Kolôtes were other eminent pupils of the master. Phidias, the greatest name in ancient art—born about 490, died about 431 B.C.—was a native of Athens and pupil first of Hegesias (whose "Fighting Gladiator" is shown on Plate VI.), and then of the eminent sculptor Ageladas. Phidias, like many distinguished artists both in ancient and modern days, rose to eminence at a very early age. His first public work was a colossal gilt-wood and marble statue of Minerva, executed for the Plataians out of the spoils taken from the Persians. The "Athina Polias" erected on the Akropolis at Athens, another great statue, was in bronze and of such height that from Cape Sunium mariners could discern the crest on the helmet of the goddess.

Pheidias was only twenty-two years old when he executed this grand work. When Perikles became ruler of the Athenian republic, Pheidias was in the flower of his age and the height of his fame; and, with that instinct peculiar to him for discerning and appropriating to the state whatever was best fitted to adorn, to defend, and to do it honour, Perikles lost no time in appointing Pheidias superintendent of all the works undertaken by the people. The unrivalled temple of the Parthenon, built by Iktinos and Kallikrates, was the chief scene of his labours and triumphs. For this he executed the world-famed colossal statue of Minerva in gold and ivory (chryselephantine). The sculptures on the pediments and frieze of the Parthenon, and around the collar of the temple, were also designed by Pheidias and executed by himself and his scholars. These now constitute, though mutilated and imperfect, the famous Elgin marbles in the British Museum. But perhaps the most celebrated work of Pheidias was the chryselephantine statue of the Olympian Zeus, executed for the great temple at Elis. No work of Greek art, with the exception perhaps of the "Aphrodite" of Praxiteles, was so much admired in ancient times. It was said to have added new grandeur to religion. Its majesty and beauty and immense size impressed, delighted, and overawed all who saw it. In the age of the Antonines, nearly six centuries after the era of Pheidias, a pilgrimage to Olympia was still common in order to behold this marvel of ancient sculpture, and we have the testimony of the stoic Epiktetos that it was considered a misfortune for any of his contemporaries to die without having seen this masterpiece of art.

Third Period.—After the death of Pheidias, many eminent sculptors in various parts of Greece continued to maintain the glory of classic art. Skopas, born at Paros about 450 B.C., shortly after the death of Pheidias, was one of the most distinguished. He was the author of the famous group of "Niobe" in the Florentine gallery, and of the Eastern sculptures on the Mausoleum of Halikarnassos. The prevailing tendency, after this period, was to a less severe and more voluptuous form, and to a more finished execution. This tendency culminated in the two great sculptors, Lysippos and Praxiteles, the latter of whom may be considered as the chief master of that school of sculpture whose object is to please and fascinate the senses, as contradistinguished from that earlier and greater school which aimed chiefly at instructing and elevating the mind. The marvellous self-restraint and dignity of Pheidias are now abandoned for faithful and striking portraiture and exquisite finish of detail. Praxiteles, however, according to the testimony of all the ancient writers, was a statuary of the highest excellence both in marble and in bronze. Truth, grace, and high finish appear to have been the distinguishing attributes of his chisel (Plate V.). His most celebrated statue was that of "Aphrodite," executed for the Cnidians, and so highly was it appreciated that when Nikomachos offered to cancel a heavy debt if the Cnidians would give him their statue, they refused to part with it. Praxiteles is generally given as the first master who habitually sculptured the female form entirely nude. He died about 280 B.C. Lysippos, his most famous contemporary, worked chiefly in bronze, and is said to have executed upwards of 600 statues. Chares, a scholar of Lysippos, was the author of the celebrated Colossus of Rhodes. See RHODES, COLOSSUS OF.

Fourth Period, the Decline.—Rhodes at this time was highly distinguished as a school of art. Agesandros, Poludoros, and Athenodoros, to whom is attributed the famous group of the "Laokoön" (Plate V.), and Apollonios and Tauriskos, the authors of the "Torso Farnese," now preserved at Naples (Plate VI.), were the greatest artists of the Rhodian school. But sculpture, having now reached its highest degree of technical perfection, having lost sight

of the ideal, and having adopted the mere pleasure of the senses as its aim, speedily began to decline; though for many years it continued to be extensively practised in Greece, the coasts of Asia Minor, and the islands, where many respectable works of art were produced. If, however, we take the period between the birth of Pheidias and the age of the principal Rhodian sculptors, we shall find that the great era of Greek art is embraced within a space of 200 years. The last works of real merit were produced in the provincial school of Pergamos; and one of these, at least, ranks with the finest productions of antiquity. This is the "Dying Gladiator" of the Capitol, an absurd misnomer for what is evidently a "dying Gaul." It is probably an original work (nearly all the best antiques are copies), and as restored by Michelangelo it is one of the glories of Rome. Coeval with this was a late school of revival at Athens—the chief masterpiece of which is the beautiful "Venus de' Medici" (at Florence), which is considered to be an original work.

Roman Sculpture.—The breaking up of the vast empire founded by Alexander the Great interfered with the progress of Greek art and caused the destruction of many of its noblest monuments, and the last blow was given to it by the capture of Corinth (146 B.C.) by the Roman consul Mummius. A vast number of works of art were carried by him as trophies of his victory to Rome, which soon became filled with the finest productions of painting and statuary, gathered from all parts of Greece. Julius and Augustus Cæsar both encouraged art, and many Greek sculptors and painters were induced to settle in Rome and minister to the taste of its wealthy and luxurious patricians. Caligula was a great collector of works of Greek art, and is said to have meditated the removal to Rome of the statue of the Olympian Jupiter by Pheidias. But that his love of art was mere ostentation and vanity is amply proved by the fact that he removed the heads from many of the finest ancient statues and replaced them by his own likeness. And this, indeed, was the character of all patronage of art under the Roman emperors. Rulers and people were alike destitute of the intense love and appreciation of the beautiful for its own sake, which was so deeply felt by the Greeks in their best days, and which had been the animating and sustaining principle of the matchless art of Greece. The reigns of Trajan, Hadrian, and of the Antonines form the golden age of art in Rome, though, even under them, the ablest professors of painting and sculpture were not native artists. They were Greeks, with perhaps a few Etruscans. But that they possessed merits of no mean order is proved by the column and arch of Trajan, and still more by the statues of Antinous, the favourite of Hadrian, some of which are worthy of the best times of Greek art (see Plate V.). The bronze equestrian statue of Marcus Aurelius on the Capitol is also a very fine production. After about 200 A.D., however, sculpture began to decline in Rome, and the removal of the imperial court to Constantinople in 330 gave it its deathblow.

Byzantine Sculpture.—The successive waves of barbarian invasion that rolled over Italy effectually prevented any revival of art, and the long night of the dark ages that followed, in which the greater part of Europe was involved in darkness and ignorance, and a prey to brute force, seemed to have extinguished alike learning, laws, and arts. The fathers of the Eastern Church steadily opposed the use of beautiful forms and features in the representation of the Saviour and other sacred personages. In short, they consecrated ugliness, as the ancient Greeks had deified beauty, and as a matter of course the progress of art was arrested and paralyzed by this fatal absurdity. On the other hand, Ambrose, Augustine, Jerome, Pope Adrian I., and other luminaries of the Latin Church strenuously maintained the opinion that, in figure and feature, our Saviour was of the most perfect beauty. And thus it happened that, in the

East ugliness, in the West beauty, was consecrated as the type under which the head of the Christian religion and other scriptural persons and subjects were to be represented; and it followed as a natural and inevitable consequence that art died in Greece, its earliest home, and revived in Italy, where it had formerly been unappreciated and misunderstood.

Revival of Art—Thirteenth and Fourteenth Centuries.—Niccolò Pisano (*i.e.* of Pisa), early in the thirteenth century, is the first Italian sculptor whose works show a genuine feeling for art. In the cathedrals of Pisa, Siena, Orvieto, and Lucca, and in various other parts of Italy, many of the works of Niccolò and his son Giovanni are yet to be seen, exhibiting rare qualities of beauty and expression, though deficient in some of those technical qualities which are not to be expected in an early stage of art. One of the high reliefs of Niccolò in the pulpit of the Baptistery at Pisa is shown in Plate VII. Arnolfo of Florence, Margaritone of Arezzo, Andrea Pisano, and Guido of Como were among the principal followers and imitators of the school of sculpture inaugurated by Niccolò Pisano. Towards the end of the fourteenth century Jacopo della Quercia of Siena sculptured that beautiful fountain, and that famous tomb of the Lady Maria, which are always regarded as the turning-point in modern sculpture. The great age now came on apace.

Great Italian School—Fifteenth and Sixteenth Centuries.—Another of the most distinguished sculptors was Lorenzo Ghiberti, whose gates of the Baptistery at Florence, executed in bronze, mark a very great advance in the onward career of art. They were so superior to anything that had been done before that the famous sculptor Donatello, and the equally famous Filippo Brunellesco, architect and sculptor, on seeing Ghiberti's designs, gave up their competition and did everything in their power to insure his success. It was of these gates that Michelangelo declared that "they were worthy to be the gates of Paradise." The principal works of Donatello (1386-1466) are the fine equestrian figure of Gattamelata at Padua and the statues in the Church of Or San Michele in Florence, the best of which are a "St. George" full of courage and expression (Plate VII.), and a "St. Mark," before which Michelangelo stood one day gazing for a long while in silence, and burst out with, *Marco, perché non mi parli?* ("Mark, why do you not speak to me?") Ghiberti has some fine statues in the same church. Of Donatello's numerous followers Verrocchio was the chief. His bronze equestrian statue of "Coloani at Venice" still remains almost unequalled in some qualities. Up to this time modern art was more essentially religious; like Greek art in its best period it was the expression of the religious ideal. But a change was at hand, which interrupted the progress of this Christian school of art by diverting the ideas and enthusiasm of painters and sculptors into another channel. This change was produced by the discovery of the long-lost treasures of classical literature, and of many valuable remains of ancient sculpture. In promoting it the family of the Medici took the lead, and Florence became the birthplace and centre of this classical revival. Classical subjects began to share with Christian the honour of illustration by the best sculptors of this period. The study of the antique, the habit of drawing from the living model, and the practice of anatomy, gave greater correctness of outline, and more certainty and freedom of execution, and thus produced a technical excellence far surpassing that of the earlier periods of Italian sculpture. Luca della Robbia (1400-82), well known as the inventor of a peculiar method of enamelling terra-cotta, is highly distinguished in subjects chiefly of a religious character, simple and graceful in treatment, and touching in expression. Leonardo da Vinci, painter, architect, engineer, musician, was sculptor also, but unfortunately none of his work remains. The famous equestrian statue of Sforza, of which we read as a

marvel, was never cast, and the model was wantonly destroyed by the French in 1499.

But the greatest name as a sculptor in the history of Italian and of modern art, justly belongs to Michelangelo, equally remarkable for his inventive power and for the striking character of his execution, despising the use of the clay model and grappling at once with the marble block before him, shaping it in his imagination, and hewing out with rapid chisel the fervid conceptions of his mind. The Pieta or dead Christ, supported by the Virgin, in a chapel of St. Peter's at Rome, the "David," the "Moses" (Plate VII.), the two tombs of Giuliano and Lorenzo de' Medici (Plate VIII.), with the figures of "Morning" and "Evening," &c., all to be seen at Florence, may be pointed out as good examples of the chisel of this great sculptor, who especially excelled in expression and in knowledge of form and anatomy, though his energy and daring imagination sometimes betrayed him into exaggeration. His influence on art was immense, not only in his own times, but also upon all those which have succeeded him. He died in 1564. Pietro Torregiano—a contemporary and fellow-student of Michelangelo, whose nose he broke by a blow which he struck him in a fit of passion—was an excellent sculptor, but a man of a proud and irritable disposition. A good specimen of his talents may be seen in the tomb of Henry VII., in Westminster Abbey. The statues and bas-reliefs of Sansovino and those of Jacopo Tatti, his pupil, more often called also by the name of his master, Sansovino, display considerable genius, and several works still existing in Florence exhibit the power of Baccio Bandinelli. (See Plate VIII.) Benvenuto Cellini (1500-71) is better known for his exquisite work in gold and silver and precious stones, than by his statues; yet the "Perseus with the head of Medusa" at Florence (see Plate VIII.), and the bronze alto-relievo of the "Diana of Fontainebleau," show great power and expression, somewhat disfigured by that tendency to ostentation and exaggeration which were peculiar to the character, writings, and sculpture of this remarkable man. Giovanni da Bologna (1524-1608) executed several beautiful statues and bas-reliefs at Florence in marble, bronze, and terra-cotta—among them the celebrated group in marble called the "Rape of the Sabinus," and the "Flying Mercury," in bronze, now in the Florentine gallery. (See Plate IX.)

The Decline.—Towards the end of the sixteenth, and during the seventeenth century, sculpture and painting both began to decline; and as regards sculpture the works of the chief artists of this epoch are marked by the same faults that characterized those that were executed during the decay of classic art eighteen centuries before. There was the same loss of executive display, the same propensity to fascinate the eye instead of affecting and improving the mind. Perhaps Bernini may be pointed out as the representative sculptor of this period, the man who was most conspicuous both for its characteristic excellences and vices. He filled the seventeenth century with his renown, and was only eighteen when he sculptured his "Apollo and Daphne," once held to be a masterpiece, but now discredited. Every one now detects the bad taste with which the artist here represented the fingers and toes and redundant tresses of the nymph as sprouting forth into laurel leaves, just as the eager god is about to overtake her (Plate IX.) The influence of his style, which grew rapidly worse as he grew older, was disastrous upon taste and practice in sculpture, and it endured for a century. In the hands of his followers and imitators, such as Algardi, Buscaglioni, Mocchi, &c. (a specimen of whose best work is given in Plate IX.), sculpture decayed; till in the eighteenth century it had alike ceased to deserve and to receive public encouragement, and fell into a state of lethargy, from which it was only roused by the taste and genius of Canova.

The Modern Revival.—Canova, to whom, along with

Flaxman, belongs the honour of restoring modern sculpture to truer principles and purer taste, was born in the Venetian territory in 1757. When only sixteen he produced his "Orpheus and Eurydice," and soon afterwards his fine group of "Dædalus and Icarus," and devoted his spare time to the careful study of anatomy and literature, which eventually enabled him to strike out an entirely new style for himself, in spite of the opposition of the leading artists of the day. Canova's figures are too often characterized by a voluptuous character and an air of coquetry which impairs their effect. But many of them also possess much vigour, energy, and grandeur, such as the "Theseus and Minotaur," "Hercules and Lyons," the three statues of the Popes (Clement XIII., Clement XIV., and Pius VI.), the group of the "Boxers" in the Vatican, and some others. They in general display a wonderful knowledge of anatomy and a marvellous finish and power of execution. Canova died in 1822.

In France the influence of Benvenuto Cellini, who started the native school, was long supreme. Jean Goujon (died 1572) was the earliest French sculptor of eminence, and fine work by him still exists. The seventeenth century is made remarkable by Pierre Puget (1622-94), architect, painter, and sculptor, and alike eminent in all characters. His "Milo of Crotona with the Lion," and other works in the Louvre, are splendid creations, rising rather on the side of a painful reality, but striking and noble. In the following century Houdon (1740-1828), known best by his remarkable statue of Voltaire seated in a chair, one of the most striking of modern works, stands out pre-eminent. The present state of French sculpture is not encouraging. Simple sensuous beauty, chiefly of the female figure, is almost exclusively in vogue. In 1886 M. Bartholdi completed a very noble colossal figure of Liberty, which was presented to the American nation and erected at the entrance to New York harbour. It is made of metal plates, and stands over 100 feet high. It bears a torch, lit by the electric light.

In Germany three sculptors are especially conspicuous—Thorwaldsen, died at Copenhagen in 1844; Schwanthaler, born in 1802, died 1848; and C. Rauch of Berlin, born in 1777, died in 1857. The greater part of Thorwaldsen's artistic life was spent in Rome. He was Canova's contemporary, but infinitely superior to him in taste and the true classic feeling. He was particularly remarkable for his success in bas-reliefs, in which, among the moderns, Flaxman alone can rival him. As good examples of his skill in this branch of art we may point out the noble compositions known as "Night" and "Morning," which have been frequently engraved, and now decorate the splendid collection at Chatsworth. Schwanthaler was an artist, not only of great genius, but of immense industry and remarkable executive power. One of his most successful works is the colossal statue of Bavaria, which stands in front of a Doric temple of white marble, called the Ruhmeshalle or Hall of Heroes. Christian Rauch of Berlin is one of the most distinguished of German sculptors. He neither followed the antique nor the style of Canova or Thorwaldsen, but struck out for himself a modification of the old German style, as exhibited in the works of Albert Dürer and Fischer. He has been very successful in busts and monumental statues. The Schadows—Johann Gottfried the father, who died at Berlin in 1859, and Rudolph, the son, who died at Rome in 1822, at the early age of thirty-seven—are other German sculptors well deserving of notice. Danneker of Stuttgart is also worthy of notice for his beautiful "Ariadne," now at Frankfurt, and Ernst von Bandel (1800-76) for his "Arminius."

This brief sketch of sculpture is fitly closed by a notice of the British school. The first painters and sculptors employed in England were all, or almost all, of foreign extraction. Native talent was late in exhibiting itself, though afterwards rapid in its progress; and not much

more than a century has elapsed from the first imperfect efforts of sculpture to the rise of the present school, which is based upon the purest principles of Greek art, and is certainly not surpassed by any existing school in Europe. That school, commencing with Grinling Gibbons, so celebrated for the unrivalled beauty of his carvings in wood, has produced Rouilliac, Scheemakers, Banks, Newton, Bacon, Nollekens, Flaxman, Westmacott, Chantrey, Wyatt, Gibson, McDowall, Foley, Landseer (who produced the lions of the Nelson Monument), Marochetti, Stevens (of the Wellington memorial), Thornycroft, Leighton, and many other eminent artists. Of all these great men he who was most successful in creating and diffusing a pure taste and correct principle in sculpture, both by precept and example, was John Flaxman, professor of sculpture in the Royal Academy. He did more to improve English sculpture and to base it upon true and enduring principles than any other artist, and at the period of his death enjoyed a European reputation such as no English sculptor had ever before achieved. Whatever successes our national school has won are largely owing to the exquisite taste and firm adherence to true art of this distinguished man.

Of works on the history of sculpture Winckelmann's German work (1761) may claim to be the first of much importance. It has of course since been largely superseded. Westmacott's "Handbook of Sculpture" (1861) is a good work, and more recently several excellent English works on the subject have been published, the best being Perry's "Popular Introduction to the History of Greek and Roman Sculpture" (1882); A. S. Murray's "History of Greek Sculpture" (1880 and 1884); Mrs. Mitchell's "History of Ancient Sculpture" (1884), which includes Egyptian and Assyrian art; and Leader Scott's "Renaissance and Modern Sculpture" (1886), a small but copious account, starting from Niccolò Pisano.

SCURF is a material composed of minute portions of the dry external scales of the cuticle. Sometimes they separate in unnatural quantities, and this constitutes the disease called Pityriasis.

SCURVY. See ANTISCORBUIC.

SCURVY-GRASS (*Cochlearia*), a genus of plants belonging to the order CRUCIFERÆ. The species are annual or perennial herbs. Common Scurvy-grass (*Cochlearia officinalis*) is a native of Great Britain, in muddy places near the sea-coast. It is found also all round the Arctic Circle. It is a low-growing herbaceous plant, with a rosette of heart-shaped stalked root-leaves, the upper leaves being sessile; the flower stalks are 6 to 12 inches high, with numbers of small white flowers. This plant varies much in size, and two or three varieties have been described. When fresh it has a peculiar smell and a bitter acid taste, which are quite lost by drying. The fresh plant is a stimulant, and possesses the antiscorbutic virtues of the whole order. It has, however, a peculiar reputation in the disease called scurvy; hence its common name. It is sometimes used as a salad.

SCUTAGE. See ESCUAGE.

SCUTARI (corrupted by the Italians from the Turkish *Uşakdar*) is a town of Asiatic Turkey, on the eastern shore of the Bosphorus, and immediately opposite Constantinople, of which, indeed, it forms a suburb. Its situation is eminently beautiful. Among groves and gardens it rises, terrace after terrace, on the sides of a considerable hill, and crowns its summit with the domes and minarets of numerous graceful mosques. It is the seat of a flourishing trade, with many well-stored bazaars, silk and cotton manufactories, and large granaries of corn, and is connected by rail with Ismid, on the Gulf of Ismid. The population is estimated at 60,000.

Scutari contains a college of howling dervishes, batha, minarets or kitchens for the poor, and extensive cemeteries, planted with venerable cypresses, which the Moslem holds

in peculiar reverence, from a belief that his race will one day be driven across the Bosphorus to their Asiatic home. It was anciently called *Chrysoopolis*, or the golden city, in consequence, it is said, of the Persians having established a treasury here when they invaded Greece. Near this place Constantine finally defeated Licinius in 324. Two miles to the south lies the village of Kadiköi, the ancient *Chalcedon*.

The vast barracks on the outskirts of the town, built by Sultan Mahmud, were converted into an hospital for the sick and wounded of the Anglo-French army in the Russian War of 1854-55, under the superintendence of Miss Florence Nightingale. On the cliffs overlooking the Sea of Marmora extends the English Cemetery. A monument executed by Baron Marochetti, at a cost of £17,000, has been erected here to the memory of the soldiers who fell in the war. It consists of a pedestal, flanked at the four sides by angels, and crowned with a tall obelisk-like pillar. The inscription is simple: "This monument was erected by Queen Victoria and the British People."

SCUTARI (*Skodré*, in Albanian, and *Iskanderé*, in Turkish), a considerable city of Northern Albania, and the capital of a pashalic in European Turkey, is situated at the southern extremity of Lake Scutari, where the Boyana issues from it, and about 18 miles from the coast of the Adriatic. Immediately adjacent to the town is a lofty height, crowned by a citadel, and containing the residence of the governor, with an arsenal and barracks. The population is estimated at 40,000, about one-half of whom are Roman Catholics. The only important public buildings are—the bazaar, several mosques, and the Greek and Roman Catholic churches. There are yards for building coasting vessels, and some manufactures of silk, cotton, and woollen goods, and fire-arms. The merchants of this place are the chief traders in Western Turkey; they export wool, raw silk, wax, hides, skins, tobacco, and dried fish, to Trieste, Constantinople, Venice, and Corfu; and import in return colonial produce, with cotton and woollen manufactured goods, for sale at the large fairs in the Ottoman dominions. Two rivers running through the town frequently inundate the greater part of it. Scutari is the only place on the Boyana which the Turks are allowed to fortify by the treaty of Berlin. The *Lake of Scutari* is about 30 miles in length from north to south, and 3 to 5 miles in breadth, and contains several small islands. It lies in the high land of Albania, and is well stocked with fish, which forms the principal food of the inhabitants of the numerous villages on its banks. One kind is like the sprat, and, after being dried by the Montenegrins, is much esteemed in Dalmatia.

SCYLLA and **CHARYBDIS**. Scylla (Gr. *Skulla*) is a rocky cape on the west coast of Southern Italy, which juts out into the sea in such a manner as to form a craggy peninsula at the mouth of the Straits of Messina. The ancients fabled that Scylla, a daughter of Phorcus, was changed by Kirkê (Circe), out of jealousy, into a frightful sea-monster, and placed in a cave of this rocky point in order to inveigle mariners to their destruction. She was said to possess twelve feet, six long necks and mouths, each furnished with three rows of sharp teeth, and to bark like a dog. The navigation of this part of the strait was supposed to be attended with great danger, but this may have been owing to the imperfect seamanship of the navigators. At present the smallest fishing bark doubles the cape in safety. A fort and town were built on the rock about 500 B.C., which are now represented by the modern Scilla or Sciglio, in the province of Reggio-Calabria, with a population of 8000, large silk factories, and extensive fisheries. The town is built in terraces rising one above the other from the sandy bays which lie on either side of the promontory, and is surrounded by vineyards and groves of mulberry trees. The castle, built on the brink of the

cliff, was captured and garrisoned by the English after the battle of Maida (1806). The French besieged it in 1808, but its small garrison succeeded in effecting their escape.

Charybdis (Gr. *Charubdis*), described by the ancients as a terrible whirlpool, was placed by Homer and Virgil immediately opposite Scylla, for the purpose, doubtless, of enhancing the horrors of the scene. They pretended that she was a ravenous woman, daughter of Poseidon and Gaia, transformed by Zeus for stealing oxen into this whirling gulf, which thrice every day sucked in the ocean waters, and thrice every day regurgitated them.

Modern geographers, however, have transferred Charybdis to a spot situated outside the harbour of Messina, about 10 miles from Scylla. This whirlpool, known as the *Galatari*, corresponds with the accounts given by the ancient writers more closely than the present currents off the Faro Point. It remains to be considered, however, whether the lapse of ages and the action of repeated earthquakes may not have materially changed the currents which once rendered this passage dangerous.

The distance across the straits from the Castle of Scylla to the Faro Point is 6017 English yards. The great fishery of the *pesce-spada* or sword-fish (*Xiphias gladius*) affords occupation to its fishermen during the months of July, August, and September.

SCYTHIA. The name of Scythians is sometimes applied by the ancient writers to all the nomad nations in the north of Europe and Asia. But the Scythia of Herodotus comprised the land between the Carpathians and the Tanais (Don). Herodotus ascribes to its inhabitants an Asiatic origin. His excellent account leaves no doubt but that they were a part of the great Mongol horde.

The only two important events in the history of Scythia mentioned by Herodotus are (1) the invasion of Media by the Scythians (B.C. 635), and their conquest of Asia as far as the confines of Egypt, which they held for twenty-eight years; and (2) the unsuccessful invasion of Scythia by Darius Hystaspis (B.C. 507). In the time of Pliny the Scythians had become extinct as a people, their place was occupied by the Gomers and Samatians, and the Scythian name was confined to the remote unknown tribes of the north. The name of Scythia began to be applied to the northern parts of Asia in the Macedonian period, as the expeditions of Alexander led Europeans among the Mongol kindred of the true Scythians, and continued to be its name during the Roman period.

SEA, a term used in opposition to *land*, to designate the continuous bodies of water on the surface of the earth which inclose the continents and islands. Nearly three-fourths of the superficies of the globe are sea.

Sea-water has a salt and somewhat bitter taste, and in its natural state is unfit for drinking or for culinary purposes. Its specific gravity is about 1.0277, rain-water being 1.0000. The water of closed seas into which many rivers fall is lighter, as that of the Baltic, which is only 1.0067. In those parts of the ocean which approach the poles the water is of less specific gravity than in those parts which lie towards the equator—a circumstance which may be due to the melting of the enormous masses of ice that are found in the higher latitudes, and to evaporation. The water of the Baltic contains only 1.18 per cent. of salt, but that of the Mediterranean contains 1.18 per cent.; the former being considerably below, and the latter somewhat above the average of the oceanic water.

The sea at a great distance from the land has exceedingly fine ultramarine tint, which cannot be considered due to reflection from the atmosphere, is the colour is frequently of a deeper hue than that of the sky, and does not change even when the latter is covered with clouds. This colour undergoes some changes in shoals, where it is modified by the matter which forms the bottom. The greatest variety in the colour seems to occur in the Green-

land Sea between 74° and 80° N. lat., where it varies from ultramarine to olive green, and from the most perfect transparency to deep opacity. The green is liable to changes in its position, but still it is always renewed near certain situations from year to year, frequently constituting long bands of various dimensions, and sometimes extending two or three degrees of latitude in length, and from a few miles to ten or fifteen leagues in breadth. This occurs very generally about the meridian of London, and the whales chiefly feed in this green-coloured water. When examined by Scoresby, it was found to contain a great number of medusæ, with other substances resembling small filaments of fine hair.

The transparency of sea-water increases with the distance from the shores, and is generally greater in the higher than in the lower latitudes. But there are many remarkable exceptions to the last-mentioned fact. Some parts of the sea between the tropics are distinguished by the transparency of their waters, especially the Caribbean Sea, where zoophytes and sea-plants, though growing on a bottom 30 feet deep, appear to be near enough to the surface to be plucked by a person in a boat. In the northern seas the bottom under a vertical sun may sometimes be seen at the depth of from 100 to 500 feet.

One of the most remarkable properties of sea-water is a certain luminous appearance, which has been observed at night in all seas, but appears in its greatest splendour between the tropics. The path of a vessel seems like a long line of fire, seen from the stern, while, as the waves are parted by the prow they appear vividly luminous, flash in sheets of brilliant flame, or scintillate with the brightest sparks. The screw of a steamer appears as though illuminated by the brightest light, and the log-line trails behind the vessel in a streak of the most brilliant silver. Sometimes in the Indian Ocean and the tropics, the sea on a dark night will suddenly become of a milky white colour as far as the eye can reach. This beautiful phenomenon is attributed to the presence of myriads of minute animals and animalcules, which emit a phosphorescent light.

From the laws of gravitation it is inferred that the surface of the sea is always at the same distance from the centre of the earth, and that consequently it forms a uniformly regular curve. But though this inference is theoretically and generally true, careful observation has shown that some parts are more elevated than others. This is particularly the case with closed seas, in which the level is higher than that of the ocean, when the mass of water brought into them by rivers is greater than that which is lost by evaporation, and the straits by which they are united to the ocean are not wide enough to carry off the surplus waters quickly. In conformity with this principle it is found that out of the Baltic and the Black Sea, both of which receive immense volumes of water from the numerous large rivers that enter them, there are steady currents through the straits that connect these seas respectively with the German Ocean and the Propontis. On the other hand, when the evaporation is greater than the supply of water from rivers, the level of the closed sea sinks below that of the ocean, and consequently there is a rush of water from the latter through the strait which unites them. This is clearly exemplified by the Mediterranean, which has a lower surface than the seas with which it is connected, in consequence of receiving a very scanty supply of water by rivers (for, with the exception of the Nile, no large stream falls into it), and in consequence of losing by evaporations, as shown by Dr. Halley, nearly three times as much water as is brought into it by the rivers: the result is that the deficiency is supplied in two ways, by the current of the Dardanelles, which brings to it the surplus waters of the Black Sea and of the Sea of Marmora; and by the current which runs through the Strait of Gibraltar from the Atlantic Ocean.

The Red Sea receives no stream of any importance, and it must lose a considerable volume of water by evaporation, which loss is supplied by the current into it from the Indian Ocean through the Strait of Bab-el-Mandeb. But from May to October north winds prevail all over this sea, which cause a continual current for this interval through the strait into the Indian Ocean, leaving about 2 feet less water on the reefs in the northern part of the Red Sea. The high-water mark in the Atlantic is 13.55 feet lower than in the Pacific, and the mean level of the latter is 3.52 feet higher than that of the Caribbean Sea, of which the level is higher than that of the Atlantic near the Old Continent. The north-eastern trade-winds force a great volume of water from the North Atlantic into the Caribbean Sea, and this is greatly increased by the Guiana current, which enters the same sea by the strait between the Islands of Martinique and Trinidad. Such volumes of water, being arrested by the long isthmus which separates the Caribbean Sea and the Gulf of Mexico from the Pacific, must produce a considerable accumulation of water along the western shores of those seas, and raise them considerably above the common level of the Atlantic, and this inference is confirmed both by observation and by the rapid current called the Gulf Stream. See ATLANTIC OCEAN.

It was necessary to explore more closely the depths of the sea, to facilitate the laying of submarine telegraphic cables; and the important additions to scientific knowledge thus elicited induced the British government to send out several vessels to carry on sounding and dredging operations in various parts of the deep seas. The cruises of the *Lightning*, the *Porcupine*, and the *Challenger*, extending from 1868 to 1874, revealed the existence of an extraordinary abundance of animal life at the bottom of even the deepest ocean abysses—and life, too, under quite as great a variety of strongly-marked tints as is found in more accessible waters. Over what may be called the warm or shallower area this animal life consisted chiefly of the globigerina variety, actively engaged in the chalk formation. From the more profound depths animals of high organization, and with perfect eyes, were brought to the surface, and the creatures discovered included an extraordinary collection of siliceous sponges and foraminifera, together with zoophytes, echinoderms, molluscs, annelids, and crustaceans. (See an exceedingly interesting work, "Depths of the Sea," by Dr. Carpenter, J. George Jeffreys, and Sir Wyville Thompson; and the "Official Record" of the *Challenger* Expedition, fifteen vols., London, 1880-81.)

The bottom of the sea, like the surface of the land, is diversified by mountains and valleys and plains of different elevations. The most extensive formation of submarine table-lands occurs in the great series of banks that lie at no great distance from the east coast of the United States, and with little intermission extend from Newfoundland and the Gulf of St. Lawrence to the most southern extremity of the peninsula of Florida; to the westward of which, in the Gulf of Mexico, lies the Tortuga Bank, which skirts the shores of the United States as far west as the mouths of the Mississippi. This series of banks is more than 1400 miles in length; but there is always water enough on them, with the exception of the Virgin Rocks on the Great Bank of Newfoundland, and the shoals of St. George's Bank, for the largest vessels. These banks are frequented by immense shoals of cod and other fish.

South-eastward from the banks along the east coast of Florida, and separated from them by the Gulf Stream, are the Columbian banks, which extend to the Mona Passage between Haiti and Puerto Rico, and consist of the Little and Great Bahama banks, which occupy the north-western portion of the group, and of five smaller banks occurring at great distances from one another in a south-eastern direction. These banks have from 15 to 20 fathoms water on their edges, but they are beset with rocks and shoals, of

which a few are dry at low water; they are therefore shunned by vessels. The surface of the banks consists of coral, covered with shells and calcareous sand. On their eastern edges, along the Atlantic, are the Bahama Islands.

There are several banks in the Indian Ocean; the most extensive are those of Saya de Malha and Nazareth, the former extending between $8^{\circ} 18'$ and $11^{\circ} 30'$, and cut by $61^{\circ} 30'$ E. lon., the latter stretching from the Cargados Islands, in $16^{\circ} 47'$ S. lat., 60° E. lon. to 14° S. lat.

The Agulhas Bank, which skirts the southern extremity of Africa from the Cape of Good Hope to Cape Padrone, east of Algoa Bay, is not divided, like the other banks, from the continent by a tract of deeper water; it is therefore not to be considered as a table-land, but as a submarine prolongation of the continent. Between Cape Agulhas and Cape Vacas it extends above 150 miles from the mainland. The depth of water on this bank varies between 30 and 90 fathoms. The surface is composed of coarse sand, corals, shells, and small stones. Along its western edge it is skirted by a mudbank, covered by water from 50 to 120 fathoms deep.

There are numerous banks in the Pacific, especially south of 20° N. lat. All the large ones are surrounded by coral reefs, on which small islands occur.

The depth of the Baltic Sea varies between 30 and 40 fathoms, and only in two or three places sinks below 100 fathoms. The North Sea is somewhat deeper in its northern part. Between the Shetland Islands and the coast of Norway the depth varies between 80 and 140 fathoms, but gradually diminishes towards the south. In the Straits of Dover the maximum depth is only 26 fathoms. The depth of the English Channel increases as we proceed towards the west, but very slowly. East of the Eddystone it does not exceed 50 fathoms. The Irish Channel has a depth of between 60 and 80 fathoms. The Mediterranean is much deeper than the Baltic and North Sea, more especially along the southern coast of Spain and about the Island of Sardinia, where the depth varies between 500 and 1000 fathoms. A shallow tract extends from Tripani in Sicily to Cape Bon in Tunis; it is called by the Italian sailors *Scherchi*, and is of inconsiderable but very variable depth. The sea which surrounds the islands of the Indian Archipelago seems nowhere to sink much below 50 fathoms. The depth of the North Atlantic has been satisfactorily ascertained to be in places 20,000 feet, but there are considerably greater depths in the region between the United States, the Bermudas, and Newfoundland. The Bermudas appear to rise sheer up from a depth of between 2500 and 3000 fathoms. Only 80 miles from land the *Challenger*, when sounding here in 1873, found a depth of 3875 fathoms, being 23,500 feet, or about $4\frac{1}{2}$ miles. This was thought to be the greatest ocean depth, but in the North Pacific, near Japan, a depth was found of 27,000 feet, or more than 5 miles.

The depth of the sea near the land varies with the nature of the shores. Where the country near the sea is elevated, and terminates in high and rocky shores, it is generally considerable. Such shores have usually good and safe harbours. But when a low plain terminates with a flat sandy bank the sea is shallow, and frequently continues to be so to a great distance.

It is a well-established fact that places near the sea have a more uniform climate than those which are at great distances from it, though in the same latitude. Inland places experience a much greater degree both of heat and cold than places on the coast, and the difference between these degrees of heat and of cold increases with the distance from the sea. The explanation of this phenomenon is pretty clear, since it has been proved by observation that the temperature of the air over the sea is less subject to changes than, or rather does not undergo such great changes as, that of the air which is over the land.

Winds must, of course, affect the temperature of both elements. It appears to be established, by the observations of Péron, that the temperature of the water is always diminished during a gale, but at a much slower rate than that of the air. Weddell, in 53° S. lat., experienced a chilling south wind, by which the temperature of the air was reduced to $39^{\circ} 30'$, whilst that of the sea was $49^{\circ} 30'$.

It is a very remarkable phenomenon, which has not yet been satisfactorily explained, that the temperature of the sea generally decreases as the land is approached, and it also decreases on shoals and banks; and as this decrease may be detected by the thermometer at a considerable distance from land, this instrument is used for the purpose of ascertaining the approach to land or the presence of shoals. With regard to the temperature of the sea from the surface to the bottom at any point, it has been found that, as far as the great ocean masses are concerned, the law which is constant for the earth must be inverted for the sea. The further we descend into the interior of the earth the higher is the temperature, but the deeper we dip into the sea the lower is the temperature. The general results arrived at by Dr. Carpenter in his diving exploration were that the surface temperature varied a great deal with differences of latitude and season. When high it declined rapidly, and was lost at about 100 fathoms. From hence, in deep water, there was a decline to about 1000 fathoms, at which the temperature of 38° was found, and at 3000 fathoms there was a further fall to 32° . In the Mediterranean it was found, however, during the hot months, when the surface temperature was in some cases as high as 78° , that though the temperature fell for 100 fathoms until it reached from 51° to 56° , that beyond that depth it was the same to the very bottom: depth made no difference at all. If it was 51° at 100 fathoms it would be 51° at 1700 fathoms, and if it was 56° at 100 fathoms it would be the same at the greatest depth. Upon this fact a theory was established that the cold at great depths in the oceans was caused by currents coming from the Arctic regions and constantly flowing to the equator. See OCEAN.

Masses of ice surround the two poles, and the pieces of ice which detach themselves and enter the open sea are called *heavy drift-ice*. The term *ice-field* is applied to sheets of ice so extensive that their limits cannot be discerned from the mast-head. They often occur of the diameter of 20 or 30 miles, and when they are very closely united they sometimes extend to the length of 50 or 100 miles. Their average thickness may be from 10 to 15 feet, and their surface is mostly level, except where hummocks or low ice-hills occur at the junction of the fields, and then the thickness is often 40 and even 50 feet. The smaller fields, the extent of which can be seen from the mast-head, are called *flocs*. The surface of these masses of ice, before July, is always covered with a bed of snow from a foot to a fathom in depth; this dissolves in the end of summer and forms extensive pools and lakes of fresh water. It is supposed that they are generated in the sea which lies between Greenland and Spitzbergen, and which, though navigable during the summer, is covered with a continuous sheet of ice in the colder season. The fields appear to be the parts of this great sheet formed by its breaking up at the approach of summer. *Icebergs* are immense pieces of ice, some of which attain a height of 100 feet above the surface of the sea, and a few have been observed which seemed to be more than twice that height.

These masses of ice render navigation very dangerous, and the ice-fields especially, which, from some undiscovered reason, frequently have a rotatory motion, have caused the loss of many whaling vessels. Icebergs are less dangerous on account of the small space which they occupy, and of their being deserted at night or in foggy weather more easily than ice-fields; whaling vessels often find shelter under their lee from strong adverse winds, and

supply themselves with fresh water from the pools formed during summer in their depressions.

On approaching a field of ice the *ice-blink* is seen whenever the horizon is tolerably free from clouds, and sometimes even under a thick sky. It consists of a stratum of lucid whiteness, which appears over the ice in that part of the atmosphere which joins the horizon. A clear sky presents a beautiful and perfect map of the ice 20 or 30 miles beyond the limit of direct vision, but less distant in proportion as the atmosphere is more dense and obscure.

It appears that there is scarcely any portion of the surface of the sea which is not subjected to some kind of motion, and this circumstance must tend greatly to preserve its purity. The water in some parts of the sea is always propelled in the same direction by the currents. Nearly the whole sea is four times in the day subject to a change in its level by the movements of the tides. The motion produced by the winds is much less regular. The wind striking the surface of the sea, in an oblique direction, pushes some of the water on the surface over that which is contiguous to it, and thus raises it above the common level, until so much water is accumulated that the wind is unable to maintain it in that position, and it falls down. Each wave presents a gently-ascending surface to the windward and a perpendicular descent leeward. The elevation of the waves varies according to the strength of the wind; in very strong gales they attain an elevation of 30 feet. This motion of the surface of the sea is not perceptible to great depth. In the strongest gales it is supposed not to extend beyond 72 feet below the surface, and at a depth of 90 feet the sea is perfectly still. When the waves run to a low shore the slope of the ground breaks their force, and they terminate in a tranquil manner, but when they strike against an elevated rocky coast, being repelled by the rock, they produce what is called a *surf*. This violent rising of the sea on a rocky coast sometimes attains an elevation of 100 feet above the sea-level. The waves do not subside simultaneously with the wind; frequently during a calm after a gale they rise higher, and the most elevated part forms a more acute angle than during the gale. Such a state of the sea is called a *hulk sea*.

A *long sea* conveys the idea that the crests of successive waves are some distance apart, and that their effect upon a ship is a heavy rolling motion; a *short sea*, on the contrary, is so termed when the waves follow closely one upon another, are irregular, and crowned with a white foam. They produce a pitching motion. The *cross sea* is defined as the most irregular, and is so termed when a succession of waves is caused by a change of wind or a current in direct contact with another series caused by the swell of a recent storm.

The sea, by means of the vapours continually rising from its surface, supplies the atmosphere with sufficient moisture for the support of organic life. Those parts of the earth which are furthest from the sea are much less fertile and populous than those which, owing to their greater vicinity to it receive a larger supply of moisture from this great source.

SEA-SICKNESS, a troublesome malady frequently experienced by travellers on a voyage, of which the more prominent symptoms are a condition of general depression, giddiness, vomiting, and derangements of the bowels and of the urinary secretions. The immediate cause of the malady must be referred to the shocks received by the nervous system through the motion of the ship, similar feelings being sometimes experienced through the motion of a swing, or the riding on a railway journey with the back to the engine; but on shipboard the primary cause are often added disagreeable smells, a change of diet, the sight of the moving water, and possibly the spectacle of the sufferings of other victims. Women suffer more severely

than men, as a rule, while old people and very young children are but slightly affected or escape altogether. In the majority of cases a favourable reaction takes place as soon as land is reached if the voyage be a short one, or after a few days' illness if it be prolonged; but occasionally the first symptoms are followed by fainting, hysteria, extreme exhaustion, and even, though such cases are extremely rare, by death from syncope.

There are no known means of preventing sea-sickness in those susceptible to it, nor, in spite of all boasting advertisements, has any specific been discovered. Persons about to take a sea voyage should attend to the state of their bowels, adopt a light diet, and avoid alcohol and tobacco. When on board a recumbent position, warmly wrapped up on deck, seems to be the most favourable to safety, while an effervescent alkaline draught may help to counteract the irritant effects of the acid biliary secretions. Where there is a feeling of pain in the stomach, together with an inability to vomit, nature may be assisted by a draught of warm water or tea, and on the other hand, where the retching is persistent, ice sucked slowly may act as a sedative. Notwithstanding the sickness light semi-fluid food should be taken if possible, stronger food being taken as the stomach is able to receive it. Sometimes external sedative applications to the stomach may be required, and many persons find relief from a binder rolled firmly round the abdomen. In prolonged cases such medicines as Hoffman's anodyne, opium, chloral, and bismuth may be required, but obviously only under careful medical supervision.

SEA-ANEMONE. See ANEMONE, SEA.

SEA-BEAR. See SEAL.

SEA-BREAM (Sparidae) is a family of fishes belonging to the order ACANTHOPTERYGII. The body is compressed, oblong, and covered with minutely serrated scales. There is one dorsal fin, with from ten to thirteen spines; the anal fin has three spines; the lower rays of the pectoral fin are generally branched; the ventral fins are thoracic in position, with one spine and five rays. There are teeth in the jaws, either cutting teeth in front or grinding teeth at the sides; there are no palatine teeth. The sea-breams are inhabitants of the shallow waters of all tropical and temperate seas, and many are useful food-fishes. The Black Sea-bream (*Cantharus lineatus*) is common on the western and southern coasts of England and Ireland, and is also found in the Mediterranean. It is about 17 inches long, greenish on the back and reddish-yellow on the belly; the fins are dark gray. It is used for food. On some parts of our coasts the fishermen call it the "old wife." The Common Sea-bream (*Pagellus centrodontus*) is very abundant on British coasts, being caught in large numbers by the seine-net in autumn, especially off our southern coasts. The body is reddish, tinged with gray, becoming lighter on the sides, and nearly white on the belly; at the origin of the lateral line is a conspicuous black patch, which is wanting in the young, called *chads* by the Cornish and Devon fishermen. The Becker (*Pagellus erythrinus*), abundant in the Mediterranean, is not very common on our southern shores. It is a beautiful fish, about 21 inches long, bluish-silvery above, and the belly and lower fins tinged with vermillion; the dorsal and caudal fins are rose red. The Axillary or Spanish Sea-bream (*Pagellus owenii*) is only known from British seas. Couch's Sea-bream (*Pagrus orphus*) is a rare visitor to the coasts of Cornwall. Another rare British species of this family is the GILTHEAD (*Chrysophrys aurata*).

SEA-BUCKTHORN. See HIPPOPHAE.

SEA-CAT or **SEA-WOLF.** See ANARRHICAE.

SEA-COW. See MANATEE.

SEA-CUCUMBER and **SEA-SLUG** are the names given to species of a class of Echinodermata, HOLOTHURROIDEA. Species are found on British coasts among seaweeds or buried in the sand. The Edible Sea-slug or

Trepang (*Holothuria edulis*) is an important article of food in China. The animals are eviscerated, and then boiled for a quarter of an hour or twenty minutes; next they are soaked in fresh water, and exposed for four days in the curing-house till they are thoroughly smoked and dried. The sea-slug thus cured is used for a thick soup which is much esteemed by the Chinese. The species of the typical genus *Holothuria* have shield-shaped tentacles surrounding the mouth, and tube feet on the dorsal side only, and without suckers.

SEA-DEVIL. See ANGLER, RAY.

SEA-EAGLE (*Haliaetus*) is a genus of birds of prey belonging to the family FALCONIDÆ, distinguished by its bill being long, strong, and convex above; its large head and body, long wings, and rounded tail; and by the tarsi being bare of feathers for more than half their length below, and covered by large scales.

The White-tailed Eagle, Sea-eagle, or Erne (*Haliaetus albicilla*) is now the commonest eagle in Britain. It is distributed over the continent of Europe, extending to Spain, Sicily, and Greece, but is rarer in the south than in the north. It is common in Greenland, but less abundant in Iceland. It ranges over the greater part of Northern Asia, and is also found in Egypt. The white-tailed eagle is generally found near the sea, but sometimes resorts to inland waters. It feeds on fishes or birds, rabbits, young fawns, &c., and carion of all sorts. It is a sluggish and cowardly bird; on the coast it is constantly mobbed by gulls, and inland rooks show the same antipathy to the robber. Its nest is usually placed on a ledge of rock on high cliffs near the coast; it is carelessly constructed of sticks, grass, bits of heather, &c., and contains two large pure white eggs. When it breeds inland the nest is generally placed on the ground or on a tree on an island in the midst of water. Though not rare on some parts of our coasts in winter, the sea-eagle only breeds in this country in the Highlands of Scotland and some of the northern islands. The female is about 34 inches long, the male being some 5 or 6 inches shorter. The general colour is dark brown, lighter on the back and neck, the primaries being nearly black and the tail white; the beak and cere is yellow, the legs and toes of the same colour, with the claws black. The young birds when first hatched are entirely covered with white down; afterwards the plumage becomes a uniform dark-brown, even the tail feathers being dark. The young are hatched early in June.

The White-headed or Bald Eagle (*Haliaetus leucocephalus*) takes the place of the preceding species in North America, and has been adopted as the emblem of the United States. It is larger than the European species, and measures fully 7 feet in extent of wing. Its general colour is a uniform chocolate-brown, with the head, the greater part of the neck, and the tail white. It is found near the sea and in the vicinity of lakes and rivers, and agrees generally in its habits with the white-tailed eagle. It displays a great partiality for fish, which it often secures by robbing the osprey or fish-hawk. As soon as it sees the osprey dash down into the waters and emerge again with its prey struggling in its talons, the bald eagle darts off in pursuit of the successful fisher. The latter, encumbered with its prey, is quite unable to contend in flight with its pursuer, who endeavours to rise above it; and the manoeuvres of the birds in this struggle for the upper hand are described as exceedingly interesting. The conclusion of the affair is, however, nearly always the same—the eagle, being quite unencumbered, generally overcomes the osprey; the latter lets its prey drop with a scream of disgust, and the piratical pursuer then descends with astonishing rapidity, and usually manages to secure the booty before it reaches the water. The nest is generally built in the tops of high trees. There are several other species of sea-eagles, one (*Haliaetus pelagicus*), inhabiting the ex-

tremit north-east of Asia and the Aleutian Islands, being the largest eagle known.

SEA-ELEPHANT. See SEAL.

SEA-FAN (*Gorgoniidæ*) is a family of Actinozoa belonging to the group ALCYONARIA, so called from the fan-like appearance of most of the species. The sea-fans form fixed colonies with a horny tree-like branched axial skeleton, surrounded by a softer tissue containing calcareous spicules. In this soft tissue are the individual zooids of the colony. The sea-fans are found in deep water in all seas. *Gorgonia verrucosa* is found in the Mediterranean and English Channel. *Rhipidogorgia flabellum* is the sea-fan of the West Indies; it is a large species, about 2 feet high and 2 feet wide.

SEA-HARE (*Aplysiidæ*) is a family of molluscs belonging to the group Opisthobranchiata, of the order GASTEROPODA. The sea-hares have a slug-like body, with the shell rudimentary and covered by the mantle, or else wanting altogether. The head is distinct and produced with four tentacles, the inner pair having eyes at their bases. The foot is long and drawn out into a tail behind. Over forty species of the typical genus, *Aplysia*, have been described from the seas of the West Indies, Norway, Britain, the Mediterranean, &c. They feed chiefly on sea-weeds. When irritated the sea-hares discharge a violet fluid from the edge of the internal surface of the mantle. This fluid is harmless, but the ancients regarded the sea-hare with superstitious dread, partly doubtless induced by its grotesque form. The violet fluid was considered by the Romans to be a deadly poison, and it was thought to be an ingredient in the draughts of the infamous poisoner Locusta. Some of the species, indeed, appear to discharge an acrid stinging secretion from their bodies in addition to the violet fluid. Several other genera are included in this family.

SEA-HORSE is the name given to a small group of marine fishes belonging to the order LOPHOBRANCHII, and forming with the PIPE-FISHES (*Syngnathinæ*) the family Syngnathidæ. The sea-horses are distinguished from the pipe-fishes by the prehensile tail and the absence of the caudal fin.

In the typical genus *Hippocampus* the body is compressed from side to side and covered with shields armed with spines or tubercles. At the back of the head is a prominent crest terminating in an elevated knob. The males are remarkable for having a small pouch, in which they carry the eggs at the base of the tail, opening near the vent. In the females the position of the pouch is occupied by a small anal fin. The sea-horses swim in a vertical position, with the head slightly bent. They often attach themselves by their prehensile tails to foreign bodies, and are thus carried to great distances. About twenty species are known, most abundant in the tropics. One species, *Hippocampus antiquorum*, tolerably abundant in the Mediterranean, occurs occasionally on British coasts. It is of a dark olive brown colour spotted with pale blue. The sea-horses of the genus *Phyllopteryx*, of which there are three species from Australian seas, are remarkable for their protective resemblance to the sea-weeds among which they live. The shields forming the pointed armour in which the body is incased are provided with prominent spines or processes, many of which bear long cutaneous filaments resembling exactly fronds of sea-weed. There is no pouch in this genus, but the eggs are embedded in soft membrane on the lower side of the tail. Two other genera of sea-horses are known, *Gastroteuthis* and *Solenognathus*, the first with one species common in the Indian Ocean, and the latter with three species from Chinese and Australian seas.

SEA-KALE (*Crambe maritima*) is a glaucous spreading plant, with broad-toothed sinuated leaves, and dense corymbs of large white flowers, found occasionally on the

sea-coast of England, and now commonly cultivated in gardens for the sake of its delicate tender shoots. Naturally the flavour of the plant is strong and disagreeable, but is rendered delicate by being grown in darkness, and with a little more speed than usual. For this purpose a garden-pot is inverted over the crown of an old sea-kale stock, in winter before the leaves sprout. Over the pot is thrown a little litter, or some decaying leaves, or some old tan, so as to increase the temperature of the earth, and to exclude light; after a week or two the pot is examined from time to time, and when sprouts 5 or 6 inches long have been produced, they are cut off and fit for table. Sea-kale loves a light sandy soil, well drained in winter and richly manured. It will continue to bear cutting for twenty years together without suffering much, and is one of the most simple and useful culinary plants for a small garden. It is generally grown in rows 18 inches or 2 feet apart. It is a native of the Baltic and Black Seas, and of the western coasts of Europe.

SEA-LEMON (*Doris*) is a genus of molluscs belonging to the group Opisthobranchiata, of the order GASTEROPODA. The sea-lemons have an oblong, oval, depressed body, resembling in shape a lemon cut in half lengthwise. The dorsal surface is studded with tubercles. The mantle is large, covering the head and foot. The gills are plumose-like, placed in a cleft at the hinder end of the back, and can be retracted into a cavity. The species are very numerous, and found in almost all seas, generally near low-water mark. There are many other genera placed in the same family, Perididae.

SEA-LEOPARD. See SEAL.

SEA-LILY (*Pentacrinida*) is a family of celinoderms belonging to the class CRINOIDEA. The sea-lilies or stalked crinoids are very rare at the present day, but in former geological periods they were extremely abundant, limestone being to a large extent composed of this fossil. They are distinguished from the Feather-stars (*Comatulidae*) by the presence of a permanent pentagonal stalk by which they are fixed. *Pentacrinus caput-medusæ*, from the Antilles, is one of the commonest recent species. The fossil species, known as *Eurynites* or *Stone-lilies*, are very abundant in Palæozoic strata. The Lily Ewermite (*Lucrinus libiformis*), the body of which with the arms closed is here figured,



occurs in the Muschelkalk of the New Red Sand-stone. The joints of the stems of these fossil sea-lilies are common on the sea-shore of parts of the north of England, where they are known as "wheel stones" or "St. Cuthbert's beads," as alluded to by Scott in "Marmion":—

"On a rock by Lindisfarne
St. Cuthbert sits, and toils to frame
The sea-born beads that bear his name"

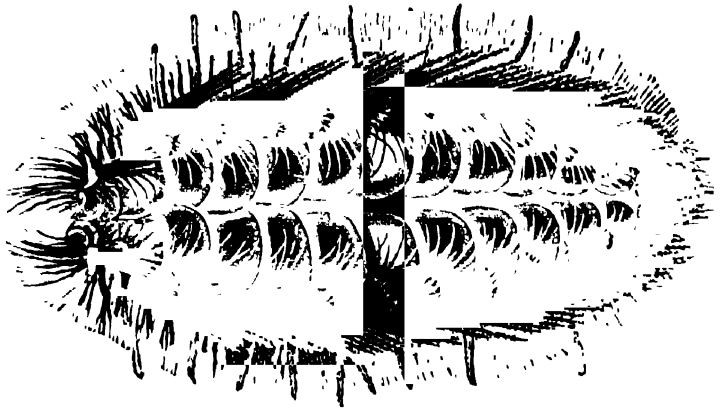
Being perforated in the centre they have been strung as beads and used for rosaries.

SEA-LION. See SEAL.

SEA-MATS and **SEA-MOSSES.** See POLYZOA.

SEA-MOUSE (*Aphrodite*) is a genus of marine chaetopod worms belonging to the group ERRANTIA. The body is generally flattened, oblong, or oval, with the integument of the back raised into a series of overlapping scales disposed in two rows. The head is distinct and bears eyes and antennæ, and there is a powerful reversible pharynx or proboscis. The lateral processes of the body (parapodia) bear a number of spines, bristles, and rudimentary branchiæ. There is no vascular system.

The Common Sea-mouse (*Aphrodite aculeata*), common on the southern coasts of England, is a very beautiful animal, oval in shape, and from 8 to 10 inches long. The scales of the back are covered by a felt of long silky hairs, which glows in the sunlight with a beauty unsurpassed either by the plumage of the humming-birds or by the most brilliant precious stones. The Porcupine Sea-mouse (*Aphrodite hystrix*), another British species, has the dorsal



Aphrodite Hystrix.

scales exposed; it is neither so large nor so brilliant in colour as the former species.

The sea-mice are found under stones at low-water mark or in shallow water; they are frequently thrown on the shore in great numbers by storms. They are carnivorous. Allied genera are *Polynoe*, *Lepidonotus*, *Sigalion*, &c.

SEA-NETTLE. See JELLY-FISH.

SEA-OTTER. See OTTER.

SEA-PEN (*Pennatulidæ*) is a family of Actinozoa, belonging to the group ALGONARIA. The sea-pens are free-swimming colonies, more or less pen-shaped, with the basal end of the stock free from zooids, and usually embedded in sand or mud. The axial skeleton is horny and flexible, covered with a softer tissue, in which are embedded the individual zooids, which are of two kinds, sexual and smaller sexless forms. The sea-pens have a very wide distribution, and are found in both shallow and deep water. Many are highly phosphorescent. The species of the typical genus (*Pennatula*) are free-swimming and are never fixed. *Pennatula phosphorea* is common in British seas. *Pennatula* has a feather-like body with the zooids placed on the side twigs of the stem. *Veretillum* has an elongated simple axis with zooids distributed over its entire surface, except at the bulbous extremity. *Renilla* has a flat kidney-shaped body without a solid axis. *Umbellularia* has a long rod-like axis, with the polyps aggregated at the upper end in a kind of umbel.

SEA-PERCH. See SERRANUS.

SEA-PIE. See OYSTER-CATCHER.

SEA-PORCUPINE and **SEA-HEDGEHOG.** See GLOBE-FISH.

SEA-SCORPION (*Cottus scorpius*) is a species of fish found on the coasts of Britain, the German Ocean, and the Baltic, nearly allied to the river BULL-HEAD (*Cottus gobio*). The sea-scorpion is found under stones and

among sea-weeds, near low-water mark, and is often left uncovered by the tide. It enters estuaries and harbours. It feeds on small crustaceans, and is often caught on our shores in shrimp-nets. The sea-scorpion has a very large head armed with spines, and a wide mouth. It is from 5 to 8 inches long, dark purple-brown with various markings on the back, and white below. It is very voracious and swims rapidly.

SEA-SERPENT. In tropical seas are found species of sea-serpents belonging to the family *HYDROPHIDÆ*; they are venomous and of small size.

The term sea-serpent is frequently used in a sense which most people still continue to hold imaginary. From very early times startling accounts have been given by voyagers of enormous serpent-like creatures seen at sea, of a length varying from 80 to 800 feet; and of late years public curiosity has been aroused and considerable speculation excited by accounts of "the great sea-serpent" from time to time—some of them by persons of undoubted trustworthiness, and given with more or less circumstantiality of details. It may be questioned, however, whether any of these reporters were so favourably situated for observation as to place them beyond all probability of mistake. Without, therefore, denying the possibility of the existence of "the great sea-serpent," it may be safely affirmed that up to this time no satisfactory proof of it whatever has been offered. It has been proved in numerous cases that the so-called sea-serpent was nothing more than a shoal of porpoises or a flock of birds flying in a continuous line close to the surface of the water. It is also possible that the enormously elongated *RIBBON-FISHES* (*Trachipteridæ*), which attain a length of over 20 feet, and also gigantic cephalopods, are in some cases the heroes of sea-serpent stories.

The existence of this monster of the deep is firmly believed in by the fishermen of the Norway coasts.

SEA-SNAIL. See *LUMP-SUCKER*.

SEA-SNIPE. See *TRI-MPET-FISH*.

SEA-SPIDER. See *PODOSTOMATA*.

SEA-SQUIRT. See *ASCIDIANS*.

SEA-URCHIN, SEA-HEDGEHOG, and SEA-EGG are the common names given to species of *ECHINOIDEA*, a class of *Echinodermata*.

SEAFORD, a small watering-place of England, in the county of Sussex, 10 miles south by east from Lewes, and 59 from London by the South Coast Railway, was formerly the port where the Ouse emptied itself into the sea; but the great storm of 1570, which diverted the channel of the Rother, made a fresh mouth for the Ouse by breaking through the beach and forming what is called the Old Harbour, now entirely closed. Seaford was anciently a member of the Cinque Port of Hastings. It suffered much from French attacks, but more from the gradual recession of the sea. It had the honour of returning the elder Pitt to Parliament, but was disfranchised in 1832. It has now some reputation as a bathing place, a fine esplanade has been formed on the top of the long sea-wall, and many good houses for the accommodation of visitors have been erected. The parish church is Norman and Early English. It has been restored and some painted glass windows inserted. The population of the parish in 1881 was 1674.

SEA-HAM HARBOUR, a seaport of England, in the county of Durham, about 5 miles south of Sunderland, and 274 from London by the Great Northern Railway. It was founded in 1828, and owes its prosperity to the fact of its having been made the place of shipment of the coals raised in the extensive mines in the vicinity. The harbour is a very good one, and is furnished with extensive wharves, quays, and jetties, and wet and dry docks, and altogether has accommodation for a large number of vessels. In the town are extensive bottle-works, blast furnaces, an iron foundry, chain and cable works, chemical

works, and coke ovens. The town is well paved and drained, and has good buildings and business houses. There is a church dedicated to St. John the Evangelist, a Roman Catholic church, several chapels for dissenters, the Londonderry literary institute, the infirmary for seamen, and the harbour and colliery office. Population, 3000.

SEAL, in documents. See *SIGNET*.

SEAL is the common name of the aquatic carnivorous mammals belonging to the group *PINNIPEDIA*. The *Pinnipedia* are *Carnivora* adapted for an aquatic life. The group is usually divided into three families, the True or Earless Seals (*Phocidæ*), the Eared Seals or Sea-lions (*Otariidæ*), and the Walrus (*Trichechidæ*); it is with the first two families that the present article deals. Both families of seals agree in having an elongated conical body covered with a thick, close fur, short limbs, and feet converted into broad fin-like organs (flippers), the toes being long and united for almost their whole length by a membrane. In the sea-lions the hind feet can be used in walking on land, but in the true seals they are permanently directed backwards, being united to the tail by a membrane which reaches as far as the heel. The sea-lions are also distinguished by the possession of small external ears.

In the seals the backbone is remarkably flexible, owing to the size of the intervertebral cartilages, and the flexibility of the body is aided by the great development of cartilage between the bones, and the shortness and strength of the limb-bones. On each foot there are five toes; and in the hind pair the two outer toes are the longest in the *Phocidæ*. The skull is elongated and flat, with crests more or less developed in the adult. The teeth vary in number and shape. The sea-lions have thirty-six teeth in all, three incisors above and two below on each side, one canine and four premolars on each side in each jaw, and two molars above and one below on each side. Most of the true seals differ in having one molar less on each side of the upper jaw. The muzzle is short and dog-like, and furnished with long stiff bristles, which are organs of touch. The eyes are large and full. Between the body and the skin is a thick layer of oily fat or "blubber," from which the seal-oil is obtained. The fur is of two kinds, a short soft inner coat, which furnishes the seal-skins, and longer coarser hairs, which penetrate deeper into the skin and are got rid of in the process of dressing. It is the relative development of the under fur which determines the value of the seal-skin in commerce. The stomach in these fish-eating animals is simple, the caecum short, the intestinal canal long. The tongue is smooth and slightly notched at the tip, and the sense of taste is evidently well developed, as is that also of smell. The senses of hearing and of sight are also enjoyed in great perfection. The countenance of the seal and the fulness of its fine eyes, would, on a *prima facie* glance, seem to denote intelligence of no common order. In fact, the seal is not only intelligent and easily domesticated, but becomes greatly attached to those who rear it and treat it kindly. Its sagacity was noticed by Pliny, who observed that it is easily taught to perform tricks, and salute persons, and answer to its name when called. The brain is large and well-convoluted. In air-breathing animals which make the land only a temporary resort, some provision for prolonged respiration is necessary. Seals can remain underwater from ten minutes to half an hour without rising to the surface. When under water their valvular nostrils are firmly closed. The veins entering the liver are enormously dilated, and this is thought to be a provision for maintaining life during prolonged immersion, the blood being retained for a time in these reservoirs.

The True or Earless Seals (*Phocidæ*) have a long tapering body, with the limbs attached to it so as to leave only the feet free. The hind feet cannot be used for walking, but are most efficient swimming organs, the fore

feet being little used in the water. On land the seal lies on its belly and moves by a series of jerks, the fore feet only slightly aiding progression on uneven ground. In the water, however, its movements are very swift and graceful. None of the true seals produce the sealskin of commerce, though their skins are used for making leather, &c. Their oil is also very valuable.

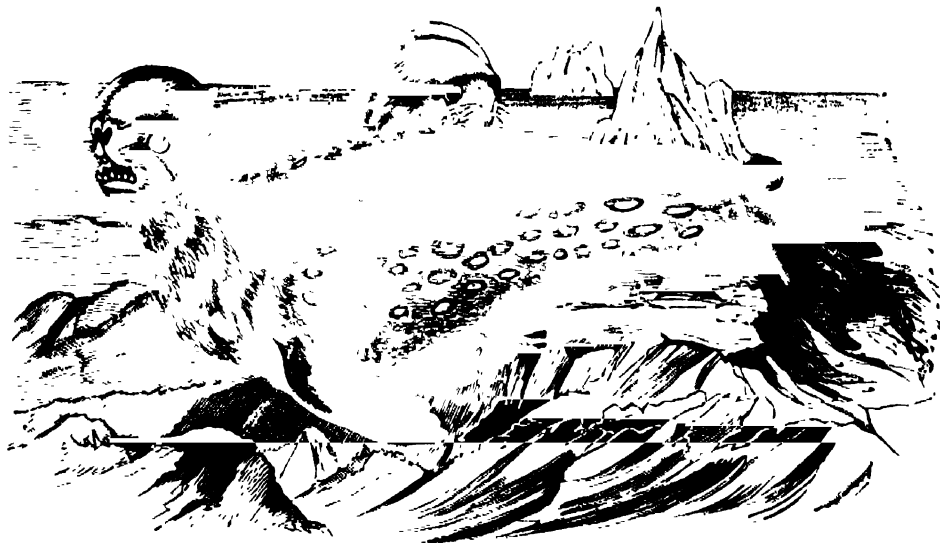
The Common Seal (*Phoca vitulina*, fig. 1 in Plate) inhabits the northern seas generally, and is also found in the Mediterranean and Black Sea. It is now scarce on the southern coasts of Britain. It frequents bays and estuaries, and sometimes goes a considerable distance up rivers. It feeds chiefly on fish, and is very fond of salmon. The young are brought forth in May or June.

The ground colour of the hair of this species, when the animal is alive and dry, is pale whitish-gray, with a very slight tinge of yellow; when just out of the water and wet, the ground colour is ash; after death, and as seen in museums, it is pale yellowish-gray, the oil having penetrated the skin and rendered the hair of a more yellow hue. The body above is clouded and marbled with blackish-gray. The space round the eyes and muzzle, the sides of the body all the lower parts, and the feet, are pale grayish, becoming nearly white beneath. There is some brown on the muzzle and upper part of the tail. The length is from

3 to 6 feet. It has a rounded head, short muzzle, moderate whiskers, and large full eyes. The skull is distinguished by the oblique position of the molar teeth.

This species is valuable in various ways. The skin is either prepared, with the fur on, for caps and other articles of clothing, or tanned to make leather. The oil, if extracted while fresh, is very clear, inodorous, and of a rather pleasant taste; a full-grown animal, if taken in spring, will yield from 4 to 5 gallons. The flesh is highly esteemed by the inhabitants of Greenland. This seal is very docile and intelligent in captivity.

The Greenland, Saddleback, or Harp Seal (*Phoca groenlandica*) is an inhabitant of the arctic seas from North America to Kamtchatka. It occasionally, however, strays to the shores of England. It is from 6 to 9 feet in length. The hair of the Greenland seal is drier and closer to the hide, and more free from wool, than that of the other species; each hair is flat and lustrous. A large brown oblique band, irregularly dentilated, commences nearly above the shoulders, where it joins that of the other side, and is carried along upon the sides and up to the hind legs, becoming by degrees brighter there, and losing itself in the white of the belly; the posterior extremity approaches that of the other side at the root of the tail. Some small brown spots are scattered about both in the



The Crested Seal (*Stenmatopus cristatus*).

gray of the back and in the pale part of the band. The bands and spots become more and more black with age. This species, when newly born, is quite white and woolly. In the first year it is cream-coloured; in the second, gray; in the third, painted with stripes; in the fourth, spotted; and in the fifth, wears its half-moons as the sign of its maturity.

To the Greenlanders this species is all-important, and its chase is a business of necessity; its skin, its flesh, its oil, its intestines are alike valuable. It leaves the coasts of Greenland twice a year—at first in March, returning in May; again in July, and reappears in September. The young (one, rarely two, at a birth) are brought forth in spring, and are suckled on the ice far from shore. These seals avoid the fixed ice, but live and sleep in vast herds near the floating ice-islands, among which they are sometimes seen swimming in great numbers under the guidance of one who seems to act as leader and sentinel for the whole. Their food consists of all kinds of fish, shell-fish included, but they prefer the arctic salmon. These seals swim in

many attitudes—on their back, on their sides, as well as in the ordinary position—and occasionally whirl themselves about, as if in sport. They sleep frequently on the water, and are considered incautious, especially on the ice.

The Newfoundland and Greenland seal fisheries are very important and lucrative, and a fleet of ships and steamers leaves Dundee every year in early spring to take part in them. About 200,000 of these seals are killed annually. The oil is very valuable, and is used both for lubricating and illuminating purposes.

The Ringed Seal or Floe-rat (*Phoca hispida*), another northern species, is very like the common seal, but is only 3 or 4 feet long; it occurs occasionally on British coasts. The seal of the Caspian Sea (*Phoca caspica*) and *Phoca siberica*, which inhabits Lake Baikal, are considered by some as varieties of the ringed seal. The Bearded Seal (*Phoca barbata*) is another rare British species, though common in the more northern seas. It is very large, 10 feet or more in length, and of a deep brownish-black colour.

The Grey Seal (*Ualichærus gryphus*) is an inhabitant

of British coasts, being especially abundant on those of Ireland; it ranges to the southern coasts of Greenland. It is a large species, about 8 feet long, yellowish-gray in colour, lighter beneath, with gray spots and blotches. It has a very flat head, with a deep, obliquely truncated muzzle. The brain is small, and this species is said to be incapable of domestication.

The Crested or Bladder-nosed Seal (*Cystophora cristata*) is remarkable for having a membranous and muscular hood on the summit of the head, formed by the prolongation of the cartilaginous septum of the nose. This species, which agrees in its distribution generally with the common seal, is one of the largest and most powerful of the seals, measuring from 8 to 12 feet in length. The fur is soft and long, woolly beneath; black in old individuals, silvered beneath; white and gray in young specimens, spotted irregularly with brown. The dilatable sac which crowns the head is covered with short brown hair. This species, which especially haunts the open sea, is said to visit the land in April, May, and June chiefly. They are found for the most part on large ice-islands, where they sleep without precaution; and occur in great numbers in Davis' Straits, whither they are stated to make two voyages a year, in September and March. They depart to bring forth their young, and return in June very lean and exhausted. In July they proceed again to the north, where they appear to procure plenty of food, for they return in high condition in September. The crested seal is said to be polygamous, and to rear its young on the ice. Its bite is formidable, and its voice is stated to resemble the bark and whine of a dog. When surprised by the hunter it weeps copiously. Among themselves they have fierce encounters, and inflict deep wounds in the conflicts with their claws and teeth. This is one of the species most generally pursued. The Eskimos clothe their women with the skins of the young, and cover their boats and houses with those of the old ones. They head their hunting-spears with the teeth, and use the stomachs as fishing-buoys.

The Elephant Seal (*Macrorhinus elephantinus*) is remarkable for having in the male the nose prolonged into a kind of proboscis, which respires violently when the animal is excited, or is elongated in the form of a tube about a foot long when it is preparing for attack and defence. When the animal is in a state of repose the nostrils are shrunk and the proboscis flaccid, giving the face a larger appearance. The male is from 14 to 20 feet long, the female much smaller. This species is found chiefly in the southern hemisphere, both in the Atlantic and Southern Oceans, between 35° and 55° S. lat., at Kerguelen's Land, South Georgia, Juan Fernandez, South Shetland, and the Falkland Islands; but it also occurs on the Californian coasts. An extensive fishery of this huge species was formerly maintained for the sake of its skin and oil; but only a few vessels from the United States now engage in it.

The Sea-leopard (*Stenorhynchus leptonyx*) is another southern species, being found on the coasts of Australia, New Zealand, &c., and far south in the Antarctic Ocean. This species has an elongated muzzle and very small claws. The male is about 12 feet in length. There is another species of sea-leopard, *Leptonyx weddellii*, from the South Orkneys.

The Sea-lions, Otaries, or Eared Seals (Otariidae) are the true fur seals, some of the species having the inner coat of short hairs so abundant and thick that it furnishes the valuable sealskin of commerce. By paring the skin on the flesh side the long coarse hairs, which have deeper roots, are got rid of, and a soft velvet-like fur remains. The lower surface of the limbs are hairless, and the fore feet have no nails. The eared seals are all gregarious and polygamous. One of the valuable species is the Northern Fur Seal or Sea Bear (*Otaria ursinus*, fig. 2 in

Plate). It is abundant in the Pribylov Islands off Alaska and in the Behring Sea. The males are between 6 and 7 feet long, of a dark brownish-gray above, lighter beneath; the females are a little over 4 feet long, of a general grayish colour. The young is of a uniform glossy black.

These seals are migratory in their habits, and the males appear off the Pribylov group about May; the females appear about a month later, and after a few weeks bring forth their young. They are polygamous, and live in families, every male being surrounded by a number of females, whom he guards with the greatest jealousy. These families each, including the young, live separate, though they crowd the shore, and that to such an extent on the islands off the north-west point of America, that it is said they oblige the traveller to quit it and seek the neighbouring rocks. Both male and female are very affectionate to their young, and fierce in their defence; but the males are often tyrannically cruel to the females, which are very submissive. If one family encroaches on the station of another, a general fight is the consequence. They will not, in fact they dare not, leave their stations, for if they did they must encroach on that of some other family. The colony breaks up in September to go southward. An enormous number of these seals is killed annually.

The Patagonian Sea-lion (*Otaria jubata*) is distinguished from the former species by the small development of the inner fur, so that it is regarded commercially as a hair seal. The adult male is of a rich brown colour, 10 or 12 feet in length, with a mane more or less developed on the neck. This species was the first sea-lion brought alive to Europe, finding a home in the London Zoological Gardens. It is one of the most docile and intelligent of its tribe. It is polygamous, and the old male is said to be very fierce and powerful. The Northern Sea-lion (*Otaria stellari*), from the North Pacific, is the largest of the eared seals, the males being upwards of 12 feet long. The skin is of a tawny colour and of little value, being destitute of fur. The Cape Sea-lion (*Otaria pusilla*) is one of the most valuable of the fur seals, large numbers of skins being brought annually to the London market. Another valuable species is the Falkland Island Fur Seal, from the Falkland Islands, South Shetland, Patagonia, &c. It agrees in habits with the other sea-lions. Several other species of otaries, both fur and hair seals, are known.

Within recent years there has been an increasing demand for sealskins to furnish articles of female attire, and for some time an indiscriminate and cruel slaughter of the animals prevailed, which in many localities led to their entire extermination. The Pribylov Islands, Alaska, is now their chief resort, the United States having wisely regulated the numbers annually killed, and taken other precautions for their systematic preservation. On the Falkland Islands, where seals once swarmed by millions, only a few thousands are now to be found; while at Jan Mayen Island, between Iceland and Spitzbergen, which is the chief seat of the Swedish seal fishery, reckless slaughter was so far lessening the chances of the trade, that the Swedish government at length adopted a close season and stringent regulations. The British government, concurring in the propriety of the step, passed an Act through Parliament in 1875, which applied the close time to British vessels proceeding to Greenland.

SEALING WAX, a composition of hard resins and materials employed for receiving impressions of various devices. Its manufacture has declined since the introduction of adhesive envelopes. It was originally introduced into Europe by the Venetians, who brought it from India. It is chiefly composed of resin, Venetian turpentine, shell-lac, and some colouring pigments.

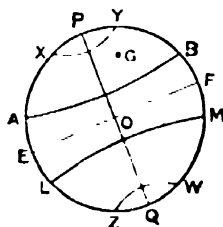
SEARCH, RIGHT OF, is that which men-of-war have in time of war, in order to ascertain whether the ship searched or her cargo is liable to seizure.

SEARCH WARRANT, a warrant granted by a justice of the peace to search for goods stolen, or respecting which other offences specified in the Act under which it is granted have been committed.

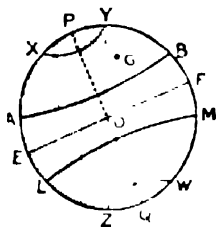
SEASONS. The succession of seasons—spring, summer, autumn, and winter—was from the earliest ages seen to be connected with the sun. It was obvious that in summer the sun was high above the heavens—that it rose early and set late. In winter the sun was low, and it passed the greater portion of each twenty-four hours below the horizon. Nor could it fail to be noticed that the phenomena of the seasons varied greatly in different latitudes. At the equator, seasons, in our sense of the word, can hardly be said to exist, the days and nights are of equal length, and the sun is always so high that summer there is perpetual. On the other hand, the variations of the seasons attain a maximum in the arctic regions; there, at the height of the brief summer, the sun never sets at all during the whole twenty-four hours; but as in any latitude the sun can only remain above the horizon for half the entire

number of hours in the year, the continuous daylight in the arctic summer must be compensated by the gloom of a winter in which the sun does not rise at all. We can render an account of these variations in the seasons, and of their special features in different latitudes, by taking into consideration the revolution of the earth around the sun and the inclination of the equator to the ecliptic. The following figure represents four positions of the earth—viz. December, March, June, and September. It is of course impossible in such a figure to make the relative dimensions of the earth and the orbit in which it moves correct; we are therefore obliged to exaggerate enormously the bulk of the earth. $r q$ is the axis around which the earth rotates once every twenty-four hours. This axis is inclined at an angle of $23^{\circ} 5'$ to a perpendicular to the plane in which the earth revolves, and remains constantly parallel to itself during the annual revolution. Every point on the earth's surface revolves in a circle around the axis $r q$, and it will generally happen that a part of each revolution will be performed on the bright side and a part on the dark side. Thus,

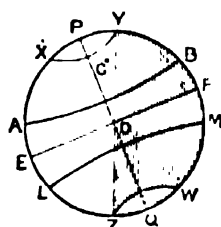
23RD SEPTEMBER.



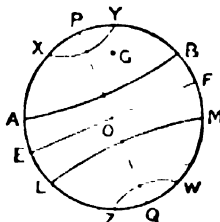
22ND DECEMBER.



21ST JUNE.



20TH MARCH.



take the position of the earth at the winter solstice on 22nd December, and let the point G denote Greenwich: when the earth rotates, G will describe a circle of which the larger part will be in the dark hemisphere; hence it is that at that season the night in the temperate regions of the northern hemisphere is longer than the day. The difference becomes still more marked as we advance towards the pole, until a critical case is presented at the arctic circle. If we draw the parallel of latitude $x y$, which just passes through the boundary of light and shade, then all places within $x y$ cannot enter the illuminated hemisphere at all, and perpetual night will there reign. The arctic circle is thus defined as the line along which the sun does just reach the horizon on the shortest day in winter. Passing

now to the south we see that a point on the equator ($r q$) travels for half its revolution in brightness and for half in shade, and the day and the night are thus equally long; but when we enter the southern hemisphere the day is longer than the night. Travelling still south we come to the point M , where the sun is vertical, and the circle passing through M is called the tropic. The tropic crossed we enter the south temperate zone, but the discrepancy between the hours of daylight and the hours of night increases until the antarctic circle, $z w$, is reached, beyond which there is no night. All the region between the antarctic circle and the South Pole enjoys continual sun-light. Such is the condition of the earth's surface, so far as day and night are concerned, about the 22nd December in each

year. As the new year opens the inequalities in the length of day and night begin everywhere to decrease, until by the 20th March the axis $r q$ has become perpendicular to the line joining the earth's centre to the sun, and then day and night are of equal length all over the globe. The sun is then at the zenith in the equator. As summer advances the inequalities of the days and the nights begin again to be manifest, but now in the northern regions the day is longer than the night, while it is the southern regions that have the night longer than the day. By the time the 21st of June has been attained this difference has become a maximum. In the regions under the arctic circle, $x y$, there is now no night, while perpetual night is found under the antarctic circle, $z w$. The sun is now vertical over the northern tropic, $A n$. Thus, on the progress from December till June the sun comes successively to be vertical over all the circles of latitude between the tropics, $L M$ and $A n$. Beyond the limits of the tropics the sun is never in the zenith. In its progress from June to September the inequalities of the day and the night again begin to decrease, until by the 23rd September the day and the night are again equal. Again the difference between night and day commences until December is reached, and the cycle recommences as before. The subject will be rendered somewhat clearer by the Plate SEASONS prefixed to this volume, in which the (relative) position of the earth is given on the last day of every month in the year. The plane of the ecliptic is in this case adopted as the plane of the illustration.

SEB, one of the chief deities of ancient Egypt, was the son of Ra. In many points he resembles the Greek Kronos, such as in being the father of the greater gods. His consort Nutpe, like the Greek Rhea, was his sister. Seb and Nutpe were the parents of Osiris (the good principle) and Isis (the maternal principle), of their enemy Seth or Typho (the evil principle), of Nephthys, the mother of Anubis, the Egyptian Charon or guide of the souls after death, &c.

SEBA'CIC or **PYROLEIC ACID**, an acid obtained by the dry distillation of fats containing oleic acid or olein, and also by oxidation of these with nitric acid. It belongs to the oxalic acid series, and crystallizes in white needles resembling benzoic acid. It melts at 127°C . (260°Fahr.), and sublimes unchanged at a higher temperature. It is soluble in boiling water, alcohol, and ether. The formula is $\text{C}_{10}\text{H}_{16}\text{O}_4$. It is dibasic, forming acids and neutral salts called *sebates*. These salts are mostly crystalline, and have the general formula $\text{C}_{10}\text{H}_{16}\text{M}_2\text{O}_4$, for the acid salts. It forms an ether called ethylic sebate or sebacic ether ($\text{C}_{17}\text{H}_{32}\text{O}_4$). This is a light, agreeably odorous liquid, boiling at 308°C . (586°Fahr.) Distilled with lime it yields a hydrocarbon called *sebacin* ($\text{C}_{10}\text{H}_{18}$). It crystallizes in scales, soluble in alcohol and ether. The crystals melt at 55°C . (131°Fahr.), and sublime at a higher temperature. The ammonium salt of sebacic acid yields on dry distillation another acid called *sebacic acid* ($\text{C}_{10}\text{H}_{19}\text{NO}_3$), in white crystals, soluble in hot water, alcohol, and ammonia.

SEBASTIAN, DOM, a celebrated Portuguese hero, the posthumous son of the Infante Prince John, by Joanna, daughter of the Emperor Charles V., was born at Lisbon, 21th July, 1554. He was proclaimed king when but three years old, and at the age of twenty he commenced a campaign against the Moors of Africa, in which he gained but little success. A fresh campaign, commenced in 1578, resulted in a tremendous battle, in the course of which, finding his troops giving way, he plunged into the thickest of the fight and there met his death. The news of his death was received with much consternation in Portugal, and many persons refused to believe it, a circumstance that was taken advantage of by two or three impostors, who ended their days on the scaffold or in the galleys. In the end a sect was formed of those who believed in his continued existence, and Dom Sebastian obtained a place along with

King Arthur, Charlemagne, Frederick Barbarossa, and other sleeping heroes whose return is anticipated at some unknown period of history. It is said that there are still "Sebastianists" to be found in Brazil.

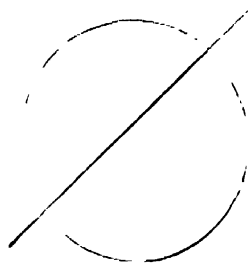
SEBAS'TIAN, SAINT, one of the early Christian martyrs, whose memory is venerated in both the Greek and Roman Catholic churches. According to the Boilandists he was born at Narbonne in the end of the second century, and educated at Milan. Although a Christian he entered the Roman army without making a profession of his faith, in order to be able to assist the persecuted Christians, and he managed his point with such skill as to rise to high favour under the persecuting Diocletian, while at the same time earning from the Roman bishop the title of "Defender of the Church." In the course of time, however, an open confession of faith became necessary, whereupon he boldly avowed himself a Christian, and after resisting all inducements held out by the emperor, was condemned to be shot to death by a band of archers. Left pierced with arrows and apparently dead, he was found and nursed back to life by a Christian lady. Hence, and after his recovery he again appeared in public and made open profession of his faith. In consequence he was condemned to be beaten to death with clubs in the amphitheatre, and this time, on 20th January, 288, he gained the martyr's crown. His body was flung into the public sewer, but its whereabouts having been revealed by a vision, it was removed by the Christians and placed in the catacomb which still bears his name. A church was built over his tomb by Pope Damasus (366-81); and his remains, according to some writers, were given to the abbot of St. Denis, near Paris, by Pope Eugenius II. (824-27), but were deposited at St. Medard in Soissons. Portions of his relics were distributed throughout Christendom. He became one of the most popular saints of the middle ages, innumerable churches were named after him, and the acts of his martyrdom were a favourite theme for artists. He is generally represented as tied to a tree and pierced with arrows. His feast is celebrated on 20th January in the Latin church, and on 20th December by the Greeks.

SEBAS'TIAN, SAN, a town in Spain, capital of the province of Guipuzcoa, is situated at the mouth of the river Urmeca, between two arms of the Bay of Biscay, which form a peninsula, 10 miles W. of the French frontier, and 381 miles N.N.E. of Madrid, by the North of Spain Railway. The streets are clean and wide, and the houses well built, the whole town having been almost rebuilt since 1813. The Plaza Nueva is surrounded by fine buildings. San Sebastian is a place of great strength, and the small harbour is very secure, being nearly inclosed by two moles, and protected from winds by the neighbouring hills. The principal imports are English, French, and colonial goods. Corn and wool are the chief exports. The peninsula on which the town is built becomes an island at high water. A stone bridge on eight arches joins the two banks of the Urmeca. The shore is exceedingly well adapted for bathing, and during the season many visitors are attracted from all parts of the country. San Sebastian was taken by the French in 1719, 1794, and 1808. After its capture on the last occasion, it remained in their hands till 1813, when it was taken by the British. In 1823, when the French entered Spain, they obtained possession of San Sebastian by capitulation. During the first Carlist war, in the northern provinces, the town was the headquarters of the British auxiliary legion, under General Fane. The population is about 20,000.

SEBASTIA'NO DEL PIOMBO. See PIOMBO.

SEBAS'TOPOL or **SEVASTOPOL** (Gr. *Sebastopolis*, the august city), a town and free port in the Russian province of Taurida, which occupies the site of the Tartar village of *Akhmar*, is situated on the western coast of the Crimea. The site of the town was chosen in 1787 by the

Empress Catharine II., who had a house erected here for her reception. The harbour is the best in the Black Sea, and is indeed one of the finest natural harbours in the world, being inclosed by lofty calcareous hills. The bay or inlet runs nearly 5 miles into the land, is from 600 to 800 fathoms broad, and from 10 to 12 fathoms deep; it is of course perfectly protected from all winds, and has no shoals. It divides into several branches or bays, which are called by different names. Prior to 1855 Sebastopol was the station of the Black Sea fleet, and the great school of marine exercise. In 1854 it was attacked by the Anglo-French army, and after a siege of eleven months was evacuated by the Russians. The chief defences were built, under the direction of Colonel Upton, an English engineer, of limestone, faced with granite and porphyry, and were composed of three tiers of batteries, each having 250 or 300 pieces of artillery. So strong were they, that the English and French artillery had very little effect on them, and their cross fire completely protected every spot accessible to a hostile fleet. A church in the form of a pyramid, built entirely of marble, was erected in the churchyard of the town in 1870. The funds for its construction were raised by subscription in the whole of Russia. The principal monument is that of Prince Michael Gortschakoff. The tombstones of the men are all alike in shape and size, and each bears the inscription—"Grave of our brothers." The inhabitants have made great efforts since the repudiation of the Black Sea Treaty in 1871 to restore the town and harbour, and to remove all traces of the havoc of war. The thorough reconstruction of the town, however, was hindered by some uncertainty as to its ultimate destination, whether military or commercial. The latter having in 1870 been officially decided upon, preparations were made to utilize to the fullest extent its exceptional commercial advantages, and it is now the second corn granary in Russia. The fortifications have been laid out as boulevards, and waterworks have been constructed. The population has greatly varied with the varying fortunes of the place, but in 1886 was about 29,000. The site of Sebastopol was anciently occupied by Greek colonists from Heraclea, who founded a city, and gave it the name of the Heracleate Clere, in memory of their original home. It survived every storm down to a comparatively late period. Two towers were entire after the siege of Sebastopol,



secant.

a little to the south. Vestiges of walls, gates, dwellings, and sepulchres, the shafts and capitals of columns, were also found strewn over the ground. The Tartars regarded them with wonder and reverence, but the Russians swept them away by using them up as building materials.

SECANT, a term of geometry, describing a straight line cutting a circle in one or in two points.

SECCHI, ANGELO, a celebrated Italian astronomer and meteorologist, was born at Reggio, 29th June, 1818, and entered the order of Jesuits in 1833. After holding for some years the chair of physics in Georgetown College, Washington, he was recalled to Rome in 1859, and was appointed director of the observatory of the Roman College, reconstructed it on a new site and plan, invented and perfected a system of meteorological observation, published a monthly bulletin continued till 1873, and constructed a meteorograph much admired at the Paris exhibition of 1867. He was commissioned by Pius IX. to complete the trigonometrical survey of the Papal States begun by Bosschi in 1751, and to rectify the measurements already

made of the meridional arc, and executed successfully a commission to bring a supply of water to Rome from Frosinone, 48 miles distant. The results of his labours in every field of astronomical research after 1850 are chronicled in the scientific periodicals of Italy, France, Germany, and England, to which he contributed nearly 800 papers. In 1856 he was elected a foreign member of the Royal Society of the United Kingdom, and similar honours were paid him by most of the philosophical societies of Europe and America. He was especially distinguished for his discoveries in spectroscopic analysis and in solar and stellar physics. After the closing of the Roman College and the expulsion of the Jesuits (1870-73) Secchi was allowed to retain his post, continued to lecture on astronomy in the ecclesiastical schools of Rome, and in 1875 he was sent by the Italian government on a scientific mission to Sicily. He died on 26th February, 1878.

SECE'DERS and SECES'SION KIRK. See UNITED PRESBYTERIAN.

SECOND, the sixtieth part of a minute, whether of time or of angular measure. See SEXAGESIMAL.

SECOND, in music. See INTERVAL.

SECOND SIGHT, a power once believed to be possessed by some persons in the Highlands and islands of Scotland of foreseeing future events, especially of a disastrous kind, by means of a spectral appearance of the persons whom those events concerned, accompanied with such emblems as denoted their fate. The belief was also held by, and was probably descended from, the ancient Scandinavians; but the superstition seems to have died away. It has undergone the fate of witchcraft; having ceased to be believed in, the supposed power has ceased to exist.

SECONDARY BATTERY and **SECONDARY CURRENT.** See BATTERY.

SECONDARY PERIOD. See MESOZOIC ERA.

SECRETARY (Fr. *secrétaire*), one intrusted with the secrets of his office or employer; one who writes for another. Its remote origin is the Latin *secretum*. The phrase "notarius secretorum" is applied by Vopiscus to one of the secretaries of the Emperor Aurelian. The first time the title of "secretarius noster" occurs is in the 37 Henry III., 1253.

SECRETARY-BIRD (*Serpentarius secretarius*) is a species of bird belonging to the order ACCIPITRIS, of which it forms a family, *Serpentariidæ*; its systematic position has been in doubt, some considering it a game bird, while others even referred it to the order GRALLÆ. This remarkable bird is spread over the greater part of Africa, but is most common in the southern portion of that continent. The secretary-bird is a large bird, standing nearly 4 feet high. The legs are very long and slender, and the tibiae are completely feathered, but the tarsi are covered with large scales. The toes are short and not formed for grasping, but are armed with sharp claws. The wings are long, and armed with blunt but strong spurs at the carpus. The body is slender and graceful. The tail is long, and the two middle tail-feathers are much longer than the rest, reaching nearly to the ground. From the back of the head and nape rises a crest of long black feathers, which the bird can raise or depress at will: it is from the resemblance of these long plumes to the quills of a secretary struck behind the ear that the name secretary-bird has been given to this species. The general colour of the plumage is bluish-gray above, with black quills; the rump is black; the throat and breast are ashy-white, the rest of the under surface black; the tail is gray, barred with black and tipped with white; the skin round the eyes is bare and of an orange colour.

The secretary-bird feeds on reptiles of all kinds, rats, insects, &c. So determined is its hostility to venomous serpents that it is specially protected by the governments

of South Africa. In these contests this bird is seldom defeated, and shows great courage and address in attacking its deadly enemy. It attacks the serpent with its knobbed wings, and strikes terrible blows with its feet; the wings also act as a shield from the reptile's attack. In most cases the serpent is soon killed, after which the secretary-bird swallows it whole, commencing at the tail, and as soon as it arrives at the head smashing the skull with its bill. Large serpents are torn into pieces before being swallowed. If the serpent bites a feather the bird is said to pull it out at once. The voracity of the bird is shown by a statement of Le Vaillant, that he took from the stomach of one which he killed when it was engaged in a contest with a serpent, three serpents as long as his arm, eleven rather large lizards, and eleven small tortoises, besides a quantity of locusts and other insects.

The secretary-bird lives in pairs, building its nest, in the construction of which both sexes engage, in a dense thicket or a high tree. The nest is large, and is added to year by year; the eggs are two in number, white spotted with brown. The young birds do not leave the nest for six months, during which time they are fed by the parents. The secretary-bird is often domesticated and kept in poultry-yards in South Africa as a protection to the poultry; but if not well fed it is said sometimes to make away with a chicken or two. It has been introduced into Martinique with a view to keeping down the numbers of the terribly venomous Lance-head (*Bothrops lanceolatus*).

SECRETARY OF STATE. The office of secretary of state is one of very ancient date, and the person who fills it has been called variously the king's chief secretary, principal secretary, and, after the Restoration, principal secretary of state. He was, in fact, the king's private secretary, and had custody of the king's signet. The duties of the office were originally performed by a single person, who had the aid of four clerks. The earliest record of such an appointment occurs in the reign of Henry III. The division of the office between two persons is said to have taken place at the end of the reign of Henry VIII., but it is probable that the two secretaries were not of equal rank until long afterwards.

The number of secretaries of state seems to have varied from time to time. In the reign of George III. there were often only two; but there are now five principal secretaries of state, whose duties are divided into five departments, namely, for home affairs, foreign affairs, war, the colonies, and India. They are always made members of the Privy Council and the Cabinet. They are appointed (without patent) by mere delivery to them of the seals of office by the sovereign. Each is capable of performing the duties of all the departments, and the offices are so far considered as one, that upon being removed from one secretaryship of state to another, a member of the House of Commons does not vacate his seat. In recent times the salary attached to the office of the several secretaries of state is £5000 a year.

To the *Secretary of State for the Home Department* belongs the maintenance of the peace within the kingdom, and the administration of justice so far as the royal prerogative is involved in it. The whole police force of the kingdom is virtually under his control. All patents, charters of incorporation, commissions of the peace and of inquiry, pass through his office.

The *Secretary for Foreign Affairs* conducts the correspondence with foreign states, and negotiates treaties with them, either through British ministers resident there, or personally with foreign ministers at this court. He recommends to the crown ambassadors, ministers, and consuls to represent Great Britain abroad, and countersigns their warrants.

The *Secretary for War* has the management of the army, assisted by the commander-in-chief, and has the sole

control of all military departments. The militia, yeomanry, and volunteers are also under his control. The office was created in the year 1855, out of what had formerly been a secretaryship-at-war, when its authority was limited to financial matters.

The *Secretary for the Colonial Department* performs for the colonies the same functions that the secretary for the home department performs for Great Britain.

The *Secretary for India* was first appointed in 1858, when the Court of Directors and the Board of Control were abolished. He has control over the government of India, countersigns all warrants and orders under the sign-manual relating to that empire, and receives all despatches from Indian governments and presidencies. He is assisted by a council of fifteen members, over whom he presides.

Each secretary of state is assisted by two under-secretaries of state, one of whom is usually permanent, and the other is dependent upon the administration then in power.

The power to commit persons on suspicion of treason is incident to the office of principal secretary of state—a power which, though long exercised, has been often disputed. The secretary of state has also power to issue a warrant by which he may direct letters to be opened which are sent through the post office. This power was the subject of much discussion in Parliament in 1845, and although it was not considered advisable to abolish it, the power has never since been exercised.

There is also a chief secretary for Ireland, generally resident in Dublin (except when Parliament is sitting), and who has always an under-secretary there. He corresponds with the home department, and is under the authority of the Lord-lieutenant of Ireland. His office is called that of secretary to the lord-lieutenant, but it is analogous to the office of secretary of state. He is sometimes a member of the cabinet.

In 1885 an Act was passed appointing a secretary for Scotland, who is invested with the usual powers of a secretary of state with respect to nearly all Scottish affairs, and is also vice-president of the Scotch Education Department.

SECRETION, in animal physiology.

ing the various processes by which substances are separated from the blood. The same term is also applied to the substance separated. Secretions may serve some other office in the economy, or may be formed merely for the purpose of being cast out of the body. In the latter case they are termed *excreta*. The two processes of secretion and excretion are properly combined in physiological terms as mere varieties of one function. They differ, however (as is elsewhere observed, see EXCRETION), in one important particular. The great excretory organs help one another—the kidneys work for the skin in cold weather, the skin for the kidneys in hot weather, &c.; but the secretory organs proper never do this—nothing else produces bile but the liver, nor milk but the mammae, nor saliva but the glands of the mouth, nor gastric juice but the glands of the stomach; and so for all other secretions.

Every secretion (including every excretion) demands a special apparatus or organ, either a membrane or a gland, and all have a basement membrane, specially differentiated epithelium cells, and bloodvessels to supply the material (the blood, namely) for the functions. The chief secreting membranes are the serous and synovial membranes (see MEMBRANE), mucous membranes (see MUCUS), and the SKIN. The secreting GLANDS are described in that article, and are divided into simple tubular glands, like the follicles of Lieberkühn (INTESTINES), compound tubular glands, like the MAMMARY GLAND, and aggregate or racemose glands, like the Meibomian glands of the eyelid, which secrete the unctuous lubricating matter of the eyeball. [See EYE.] All secreting glands and membranes present the greatest possible secreting surface in a small space; and in all of

them one end of the gland-duct opens as a free surface, while the opposite end is closed; also, in all of them the intrinsics of the ducts are filled up by a ramifying network of bloodvessels.

Secretion is either mechanical, as filtration and diffusion through membranes (probably the manner of the secretion of serous fluids, &c.), or it is chemical, and in the latter

substance of elements existing apart in the blood. The latter is infinitely the more frequent state. Secretion is accelerated by an increase in the blood-flow through the gland, by special characters of the blood, causing it for the time to be rich in the elements of the particular secretion examined, and by states of the

ch of the blood. Examples of the last are seen in the flow of milk at the cry of an infant, the flow of saliva at the thought of food, and the flow of tears at the command of the tender emotions. The great secreting organs, the skin, the mammary glands, the kidneys, the liver, the stomach, the pueras, the intestines, &c., are dealt with under their respective headings.

SECRETIONS, VEGETABLE.—Various substances are formed in plants, such as starch, resins, and volatile oils. Some of these products—starch, for instance—are only food material stored up for future use in the growth of the plant. On the other hand, certain products, such as gum, are of such a nature that in the animal kingdom we should call them excretions, that is, they result from the chemical changes which take place in the assimilation of food—they are of no further use as food, and are excreted by animals. Inasmuch, however, as these by-products in the manufacture of vegetable substance are very often not excreted, but locked in the plant, it is preferable to speak of secretions instead of excretions, notwithstanding that the term is used in a somewhat different sense in animal physiology. The chief secretions are—mucilage and resins, volatile oils, gums, mixtures of these known as balsams, milky emulsions called gum-resins, and wax.

The stem of the wax-palm (*Ceroxylon*) is covered with a resinous waxy matter, which comes off in flakes, and the bloom on leaves and fruits, like the plum, is of the same nature. Sachs, in his "Vegetable Physiology," pointed out that there is a connection between the distribution of stomata on leaves and their protection from wet by this wax-like coating. He says: "It is especially the surfaces of leaves that are well provided with stomata, which seem to be protected against the adherence of water." The leaves of water-plants, such as the *Nymphæaceæ*, *Polygonum amphibium*, *Hydrocharis*, &c., are thoroughly wetted on their lower surfaces, which have no stomata; but water runs off in round drops from the upper surface, where the stomata occur. The meaning of this fact in the economy of the plant is evident; the mouths of the stomata would be closed by prolonged contact with water, and would thus prevent the rapid ingress and egress of gas." Mr. Francis Darwin has confirmed this suggestion by a large number of experiments, detailed in a paper "On the Relation between the Bloom on Leaves and the Distribution of the Stomata" (*Journal of the Linnean Society*, April, 1886). These facts show that secretions, whilst they cannot be utilized as food, may yet be of great importance in the life of the plant. Wax is found in the epidermal layers either extended along the surface of the cuticle or imbedded in the cell-wall.

The cells of the epidermis secrete also resins and volatile oils, occasionally mixed with mucilage, gum, and sugar. The oils are very abundant in some orders of plants—for instance, in the *Labiata*—and are extracted as perfumes; lavender may be quoted as an example of the economic value of these secretory products. These bodies do not occur, like wax, over extended surfaces, but are secreted in definite cells, either in certain spots on the epidermis (*glands*), or in hairs (*glandular hairs*). In some cases

the cells become so much swollen with the secretion that they burst, and the resinous matter spreads and makes the place sticky; thus the young shoots of the birch are protected from the action of the weather by the resinous surface. So also the flowers of plants, e.g. of *Lychnis viscaria*, are protected by the exuded secretion from being plundered of honey by insects, like ants, which are of no use in cross-fertilization.

The under surfaces of gold and silver ferns, and of many *Primulas*, are covered with white or yellow dust composed of resinous matter secreted by the apical cells of small hairs.

Darwin, in his "Insectivorous Plants," has shown the existence of what may be called "digestive glands." When stimulated these organs secrete a fluid in which is dissolved an acid and a ferment like pepsin, rendering it capable of dissolving and digesting the albuminoid substance of insects, &c.

Grasses, species of *Equisetum*, *Ficus*, &c., secrete silica in their epidermal layers, which is of value in giving strength. Oxalate of lime and carbonate of lime also occur in many plants.

Another mode of occurrence of secretions, besides the epidermal position, is in modified cells at a distance below the epidermis, which may be called "secretory sacs." In the cinnamon bark of Ceylon, and in cinchona bark, there are numerous sacs, crowded with minute crystals. Sacs containing mucilage occur in mallows, laurels, *Cactææ*, &c., and also in the tubers of orchids, from which *SALER* is prepared. Sacs containing the characteristic secretions of a resinous material are found in the camphor tree, ginger, *Angostura* bark, &c. The milk of sliced onions is contained in long sacs of this nature. Tannin sometimes occurs in special tannin-sacs.

Cavities in the tissue, as well as specially differentiated cells, act as depots for secretions, and these may be distinguished from sacs as "secretory reservoirs." Short cavities of this nature containing oils are found in myrtles, eucalyptus, clove tree, orange family, the order *Rutaceæ*, &c., while the long resinous passages of pines and other conifers containing resins are well known, and often afford products of great economic value.

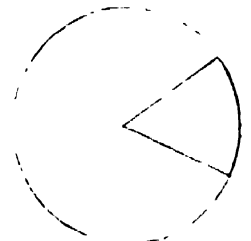
SECTION, the geometrical term for the intersection of two surfaces. In the graphical arts it means generally a plane section, and most frequently a vertical section, the horizontal section being called the plan. In architectural designs the longest vertical section is usually called the elevation, the term section being restricted to cross vertical sections perpendicular to the elevation.

SECTIONS, CONIC. See CONIC SECTIONS.

SECTOR, in geometry, is the term for a space cut off by two radii of a circle.

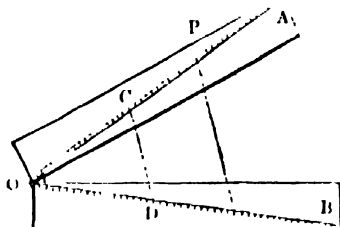
SECTOR (drawing instrument), an instrument invented by GUNTER, which has the appearance of a small carpenter's rule marked with scales in every part, the greater number of these scales not being laid down parallel to the edges of the rule, but converging towards the pivot on which the moving arm of the rule turns while the instrument is opened. These converging scales only properly belong to the sector; the others are merely laid down for convenience on such blank spaces as are left by the converging or sectoral scales.

The sector is a large number of pairs of compasses packed up into one, and most explanations of the instrument attempt to describe them all in one. It will, however, be more convenient to separate one pair of compasses



Sector

from the rest, and to describe its use. Each piece of the ruler is marked with the same scales. Take one of these scales, OA , and that which corresponds to it, OB ; then AOB is a pair of compasses which can be opened or shut at pleasure. Suppose two scales, say of chords, to be laid down on OA and OB , which are chords of 90° , OP and OQ being radii or chords of 60° . If OP be 4 inches, we have



then before us two scales of chords with the radius of 4 inches actually laid down, and any chords might be taken off them as from a common scale; for instance, if the marks of 35° be at c and d , then either oc or od is the chord of 35° to a radius of 4 inches. But suppose it is required to find the chord of 35° , not to a radius of 4 inches, but to one of 3.61 inches. We know that

$$4 : 3.61 :: \text{ch. } 35^\circ (\text{rad. } 4) : \text{ch. } 35^\circ (\text{rad. } 3.61),$$

and the fourth term of this proportion is to be found. Now this may be done with sufficient accuracy, and without any drawing, as follows:—Take a common pair of compasses and open them to 3.61 on a subdivided scale of inches. Then open the sector until the points of the compasses are made to fall on r and q . We have then $rQ = 3.61$ inches, and cd is the chord of 35° to that radius, for by similar triangles

$$\begin{aligned} OP : PQ :: OC : CD; \\ \text{or } 4 : 3.61 :: \text{ch. } 35^\circ (\text{rad. } 4) : CD; \\ \text{whence } CD = \text{ch. } 35^\circ (\text{rad. } 3.61). \end{aligned}$$

Take the compasses, then, and fixing one point at c , make the other fall on d . The distance cd may then be transferred with the compasses to the paper, or to the scales of inches, according as construction or arithmetical estimation is required.

SECTOR, ZENITH. See ZENITH SECTOR.

SECULARISM. See ATHEISM.

SECUNDERABAD (*Sikandarabad*, or Alexander's Town), a British military cantonment in the native State of Haidarabad or the Nizam's Dominions, situated 6 miles north-east of Haidarabad city, at an elevation of 1830 feet above sea-level. Secunderabad cantonment is the largest military station in India, and forms the headquarters of the Haidarabad subsidiary force, which constitutes a division of the Madras army. This force is maintained by the British government, under the terms of a treaty with the Nizam, in lieu of certain contingent and auxiliary forces which had been previously raised by the Nizam to co-operate with the British army, but had proved inefficient. The cost of the force is defrayed out of the revenues of certain districts ceded by the Nizam under the treaty of May, 1853, revised by a second treaty in 1860. The cantonment boundaries have been so extended that they now cover a total area of 19 square miles, including many interspersed villages. New double-storeyed barracks have been erected for the European soldiers, and the quarters for the native troops, which are situated at some distance, are also comfortably built. Shady trees line the roads of the cantonment, and near the European barracks and native lines are clusters of date and palmyra palms. Otherwise the face of the country is bare, with but little depth of

soil in the elevated parts. Secunderabad town, which forms the cantonment *bāzār*, contains about 8000 houses, and a population of about 32,000, all engaged in business as shopkeepers, petty traders, or artisans. During the Mutiny of 1857, an unsuccessful attempt was made to tamper with the fidelity of the troops at Secunderabad. An attack on the British Residency was repulsed, and during the troubled times of 1857–58 much good service was rendered by both the subsidiary force and the Haidarabad contingent. In the rainy season, especially towards its close, the climate of Secunderabad and its neighbourhood is unhealthy, both for Europeans and natives. The prevalent diseases are fevers, dysentery, and rheumatism.

SECURIFERA. See TEREBRANTIA.

SEDAN, a town of France, in the department of Ardennes, situated on the right bank of the Meuse. It commands the entrance into France from Luxembourg; it is also a thriving manufacturing town, and has a population of 19,556 in 1881. Sedan is 160 miles north-west of Paris, by the railway through Soissons and Rheims; it contains tribunals of first instance and of commerce, a college, an arsenal, several churches, and a public library. Sedan was the birthplace of Turpin, a native town where Colbert founded his first cloth factory in 1649. It was the scene of some of the most memorable, and, for France, disastrous, events of the great war of 1870–71; *cf.* *LOAN*, on Thursday, the 1st of September 1870, Napoleon III., with the whole French army, amounting to about 95,000 men, after being defeated in the environs by the Germans under the King of Prussia, unconditionally surrendered, and became prisoners of war. A short distance west of the town, near the railway to Metz, and close to the Meuse, is the handsome modern chateau Bellevue, the scene of the interview between the conqueror and his captive.

SEDAN CHAIR, a portable covered chair, formerly used for carrying a single person. It was borne on poles by two men. The sedan chair was introduced into this country in 1634 by Sir S. Danvers. The name is derived from the town in France where it is said to have been invented.

SEDATIVES are agents which produce a direct depression of the action of the vascular system, with little sensible evacuation. Some, as the infusion of tobacco and hydrocyanic acid, appear to destroy completely the sensibility of the heart, so that it no longer responds to the stimulus of the blood; but how this effect results is altogether unknown. Oxalic acid, when the dose is large, seems also to paralyze the heart, while in less quantities it operates differently. The peculiar mode of action of the articles entitled to be considered as pure sedatives is related under the heads of FOXGLOV, HYDROCYANIC ACID, NICOTINE, &c.

Sulphuretted hydrogen when breathed, injected into a vein or the rectum, or even applied to the skin, acts as a sedative, and in a small quantity can occasion death. Cold, when extreme, likewise acts as a sedative. The principal sedatives now in use are chloral, chloroform, acetate, carbonic acid, digitalis, hyoscyamus, chloroform, cyanide, hydrocyanic acid, and tobacco. Tincture of hops is also said to possess a similar property. See also NARCOTICS.

SEDENTARIA. See LEBECITY.

SEDGES. See CYPERACEÆ.

SEDITION (from the Latin *sedition*). Sedition does not appear to be very exactly defined. It is stated to comprehend contemptuous, indecent, or malicious observations upon the king or his government, whether made in word only, or in writing, or by tokens (which last term must comprehend pictures or drawings) calculated to lower him in the opinion of the subjects or to weaken his government. All these offences fall short of treason, but they are considered crimes at common law, and punishable by fine and imprisonment. There are also statutes against particular

acts of sedition, such as seditious libels; and various Acts against societies established for seditious and treasonable purposes, and against seditious meetings and assemblies.

The Roman sense of *seditio* is properly a disunion among the citizens, a riot or turbulent assemblage of people for the purpose of accomplishing some object by violence or causing fear.

SEDUM is a genus of plants belonging to the order CRASSULACEÆ. The species of *Sedum* are inhabitants of the temperate and warmer parts of the earth, and are mostly found in dry, barren, rocky, or arid situations, where nothing else will grow. The species are numerous; many of them are British, and a number of the foreign kinds are cultivated in our gardens. The species vary considerably in habit, some being low creeping plants, while others are erect, and a few are shrubby. The leaves are fleshy, either cylindrical or flat. The flowers are usually in cymes, star-shaped, white, yellow, or rose-coloured; the sepals or petals are usually five, the stamens twice as numerous, and the carpels three to four and many-seeded.

The Rose-root (*Sedum Rhodiola*) is found on wet rocks on mountains in the north of England, Scotland, and Wales. It has an unbranched stem, about 8 inches high, bearing at its summit numerous yellow four-parted flowers. Fertile and barren flowers are borne on distinct plants. The root, when dried, has a sweet taste and smell, and hence its common name. The Orpine or Live-long (*Sedum Telephium*) is found on rocks, walls, and dry stony places in most parts of Europe. It has a stout stem, from 1 to 2 feet high, with large flat leaves and dense corymbs of pale purple flowers. It is sometimes used as a diuretic. The Stonecrop (*Sedum acre*) is one of the most common of the genus, and is found on walls, roofs of houses, rocks, and dry places all over Europe. When chewed in the mouth it has a hot bitting taste; hence it is frequently called Wall-pepper. When applied to the skin it produces vesication, and, taken internally, causes vomiting. It is a low-growing plant with creeping stems, short fleshy leaves, and numerous golden yellow flowers. It is a favourite garden plant, being used for edgings, hanging baskets, &c. The White Stonecrop (*Sedum album*), with white flowers, is a native of Europe, in dry meadows, on walls, and rocks. It is rare in England. Some beautiful species have been introduced from Japan, and are valued as garden plants, because they flower late in autumn.

SEED, in botany, is that part of a plant which contains within several coverings the embryo or young plant, and is itself covered over with the various parts of the pericarp or fruit. The seed in its young state is called the *ovule*, which is found in the interior of the ovary at a very early period of its growth. In the article on OVULE we have considered its development up to the period when it is fit for FERTILIZATION. The development of the oosphere in the embryo-sac, consequent upon fertilization, results in the formation of a body composed of several cells, the *embryo*. On account of the difference in the embryo-sacs of Angiosperms and Gymnosperms, it is necessary to consider the process separately in the two groups.

In ANGIOSPERMS the oosphere is attached by its membrane to the summit of the embryo-sac; at first it lengthens, and then divides into two cells placed one above the other. The further division of these cells varies in different plants, but the variations may be grouped under three kinds:—(1) In the case of embryos without suspensors the two cells divide each in the same manner, and both equally contribute to the formation of the embryo. This takes place, for instance, in Mimosæ and some orchids (*Listera*, *Epipactis*, *Cypripedium*). (2) It most frequently happens that the inferior of the two cells develops into the embryo, while the upper forms by cell-division a long thread-like body, the *suspensor* of the embryo. (3) The third case is where both of the initial cells go on dividing until a large

globular mass of cells is produced, which may be called the pro-embryo. At the base of this body a projection is soon formed, composed of a number of small cells, which eventually becomes the embryo.

The external differentiation of the embryo consists typically in the formation of a stem, a radicle (or first root), and one or two cotyledons (or first leaves). Sometimes the apex of the stalk produces leaves, and this terminal bud has received the name of *plumule*. These parts can be seen in the bean. (See Plate, fig. 6b, which represents the bean deprived of the testa or skin.) Occasionally even lateral rootlets may be seen—for instance, in the garden balsam. An internal differentiation, however, has taken place even before the external. A single peripheral layer of cells has been marked off—the primary epidermis or *dermatogen*; and then an axial string of tissue is produced—the *plerome*—from which eventually arises the fibro-vascular bundles. The tissue between the dermatogen and the plerome is the primary cortex or *periblem*. The basal end of the axis of the embryo does not at first take any part in the differentiation into dermatogen, periblem, and plerome, but eventually the upper of its two cells breaks up into two layers, the outer of which is continuous with the dermatogen. This lower cell divides crosswise, and may be regarded as the first layer of the root-cap, which, as Hanstein has shown, is simply a luxuriant growth of the dermatogen. "This peripheral layer of tissue, which elsewhere remains simple, and passes over into permanent tissue in forming the epidermis, increases in thickness, on the contrary, where it covers the *punctum vegetationis* of the root, and undergoes repeated tangential divisions (parallel to the surface). Of the two layers which are successively formed on each of these occasions the outer becomes a layer of the root-cap; the inner remains as dermatogen and again undergoes the same process. This dermatogen, which covers the vegetative cone of the root, behaves therefore like a layer of phellogen, with this difference, that the cells produced from cork-cambium become at once permanent cells, while those of the root-cap remain still capable of division; so that each layer split off, as it were, from the dermatogen forms a cap consisting of several layers of cells, its growth being most active in the centre and diminishing towards the periphery" (Sachs).

We have treated of the formation of the embryo first, as being the most important consequence of fertilization, but it is accompanied by the formation of a special tissue in the embryo-sac, the *endosperm*. This process generally begins even before the division of the oosphere. The nucleus of the embryo-sac commonly divides several times, and the new nuclei move asunder so as to form a layer in the protoplasm lining the wall of the embryo-sac. They become clothed with cell-walls, and as they increase in size may at once fill up the sac, or the centre may be filled at first with a clear fluid. In the coconut the embryo-sac increases to an immense size, and the fluid, the coconut milk, remains until the seed is fully ripe. The tissue of the nucellus of the ovule which surrounds the embryo-sac is gradually absorbed, but in the Piperacæ and Nymphæacæ it remains strongly developed, and almost supersedes the small endosperm as a reservoir of food-material. This tissue, which is called the *perisperm*, altogether replaces in Scitamineæ the endosperm, which in that order of plants is altogether wanting. The cells of the endosperm (or perisperm) become filled with nutritious material, starch, or oil, to provide for the first growth of the germinating seed, and it is this stored food which makes so many seeds valuable as food for man, for the extraction of oil, &c. Sometimes the cell-walls become thickened to such an extent that the endosperm becomes a hard mass, forming, for instance, the "vegetable-ivory" in the palm *Phytelephas* and the coffee-berry of commerce. In a

number of orders of dicotyledons, the first leaves of the embryo, the *cotyledons* grow to a large size and quite displace the endosperm, becoming fleshy and stored with food-materials. When there is no endosperm left in the ripe seed, it is said, in systematic botany, to be exalbuminous, albumen having been an older term for what is better called the endosperm. The oak and the bean are well-known instances of exalbuminous seeds, the two halves of the seed being the cotyledons. See Plate; fig. 6a represents a bean; fig. 6b the same without the testa; and fig. 6 the same germinating.

In GYMNOSPERMS the general process of formation of the embryo consists in the nucleus moving to the lower portion of the sac, and forming there, by division, three layers of cells, each consisting of four cells. These twelve cells constitute the pre-embryo, the two upper layers becoming eventually the suspensors, and the third layer forming the embryo. This process is the general one in the pine and cypress groups, but varies in others. While the embryo is thus developing the endosperm is forming, and the embryo-sac increases in size until it has completely absorbed the tissue of the nucellus. The integument, partly or altogether, develops into a hard shell, and sometimes the outer layers become fleshy and give the appearance of a drupaceous fruit, as in the ginkgo and yew.

When all the changes resulting from fertilization are completed the ovule has become the *seed*, and the ovary at the same time has developed into the *seed-vessel* or *fruit*. The wall of the ovary is now known as the *pericarp*, which is sometimes differentiated into three layers, the *epicarp* on the outside, the *endocarp* on the inside, and the *mesocarp* between them. Sometimes changes even go on in parts which do not belong to the ovary, not even perhaps to the flower, and as these are associated with the changes in the ovary the whole is included in the term fruit.

Fruits may be divided into *free* fruits, formed from single flowers, and *confluent* fruits, formed of the blended flowers of an inflorescence. Free fruits may be divided into (1) *apocarpous* fruits, in which the carpels are solitary or separate; and (2) *syncarpous* fruits, composed of compound ovaries, and called (a) *superior* fruits when the calyx is free; and (b) *inferior* fruits when the calyx-tube or receptacle is adherent.

The chief apocarpous fruits are the following:—The *achene* is dry, indehiscent, containing a single free seed. In the buttercup the fruit is composed of a large number of achenes; in the strawberry they are embedded in a succulent receptacle; in the rose they are attached to the inner walls of the calyx-tube. (See Plate, figs. 15, 15a.) The *drupe* is a one-celled fleshy fruit. A good example is the peach (figs. 2, 2a), where the stone is the endocarp inclosing the seed, the flesh is the mesocarp, and the skin is the epicarp. The *blackberry* is composed of a number of small drupes. The *follicle* is a pod splitting down the ventral suture only. Fig. 11 represents the follicles of the columbine; fig. 13 the two follicles of a fruit belonging to the Apocynaceæ; fig. 13a represents one of these dehiscing and shedding the hairy seeds. The *legume* or *pod* is represented in figs. 12 and 12a; it splits down both sutures.

The chief syncarpous fruits are the following:—The *caryopsis* is the seed of grasses, for instance of the maize (Plate, fig. 1), which is composed of two or three carpels, with a dry pericarp, not separable from the seed, as in achenes. The *samara* has two or more cells; it is dry, indehiscent, with membranous wings, e.g. in the maple, elm, and birch. The *siliqua* is a two-valved pod, the valves of which separate from a kind of frame to which the placentas are attached. This form is characteristic of the Cruciferae. The *pyxis* dehisces by means of a lid, as in the pimpernel. The *capsule* (figs. 8, 8a) includes all other kinds of dry fruits which dehiscence by means of valves; fig. 9 is the

capsule of *Aristolochia*; fig. 10 represents the capsule of the poppy, of which fig. 10a is a cross section.

Of inferior syncarpous fruits we may mention the following:—The *glans* is a hard, dry, indehiscent fruit, seated in a persistent involucre forming the capsule; of this form the acorn (fig. 7) and the filbert (fig. 3) are good examples. The *bacca* or *berry* is represented in fig. 4, the gooseberry; it is succulent, with a thin skin and seeds embedded in pulp. The *pome* (for instance the apple, figs. 5 and 5a) is a many-celled fruit, in which the mesocarp is fleshy, while the endocarp forms either cartilaginous or bony partitions to the cells.

Of confluent fruits the *synconus* is a succulent fruit, formed of an enlarged fleshy flowering axis, in which are embedded numerous separate fruits with dry pericarps, e.g. the fig. The *sorosis* differs from the former in the pericarps being composed of the pulpy ovaries and floral envelopes, e.g. the mulberry.

SEGNO (Ital. a sign), in music, a word used in connection with marks of repetition. When a portion of an air is to be repeated from some particular point, that point is indicated by the mark *S*, while the words *Dal Segno*, "from the sign," are written at the close of the part to be repeated. Similarly a movement may be ordered to be partially repeated down to the sign, by the words *Da capo al S*, &c.

SEGOVIA, a town of Spain, the capital of the province of the same name, in Old Castile, 48 miles north-west of Madrid, on the rocky crumple between two valleys, 3150 feet above the sea, on the Eresma. It is surrounded by old walls flanked with towers, and entered by seven gates. The streets are generally steep, narrow, and tortuous, and the houses tolerably well built, though ancient. The chief public buildings are the cathedral, the Alcazar or Moorish castle, formerly the residence of the kings of Leon and Castile, and now used as a military college, and a Roman aqueduct of 159 arches, supported by piers of from 80 to 100 feet in height. The manufactures were at one time the most flourishing of any town in Europe, but are now of very limited extent, consisting principally of woollen and linen cloth, paper, glass, and gold and silver articles. The population is about 13,000.

SEGUIDIL LA, a national dance of Spain, in triple time, to which complets are sung by the musicians, who accompany the dance with the voice, the guitar, and the castanets. The character of the dance varies entirely with the pace at which it is taken, the *seguidilla bolero* being somewhat stately, while the *seguidilla manchega* is very gay and quick. The music is almost always in the minor mode. Like other dance forms the seguidilla is occasionally adopted for instrumental pieces by musical composers, but to a much less extent than the bolero.

SEIDLITZ, a village in the circle of Saaz in Bohemia, with two bitter salt springs, from which the well known water is obtained. There are several such springs in the neighbourhood, including those at Seidschütz, in the circle of Leitmeritz. Above half a million of bottles of the water of Seidlitz and Seidschütz are annually sent to all parts of Germany.

SEIDLITZ POWDER, a popular and agreeable aperient, is composed of 120 grains of tartrate of soda and potash and 40 grains of powdered bicarbonate of soda, which are mixed and inclosed in a blue or coloured paper. In a white paper 35 grains of powdered tartaric acid are wrapped up. The contents of the blue paper are dissolved in about half a tumbler of water. Those of the white paper are then added, and the mixture is drunk during effervescence produced by the liberation of the carbonic acid. A little sulphate of magnesia may be used to increase the strength of the powder.

SEIGNORAGE or **SEIGNORY** is the term for the mint charge covering the cost of coining. Etymologically speaking, the words mean any dues exacted to the *seigneur* or feudal lord, and more especially to the lord paramount or sovereign; hence the term grew to mean the special dues exacted from those who brought bullion to be stamped at the mint.

In England the seignorage on gold has been abandoned. The charge of $1\frac{1}{2}$ on the ounce Troy is a small commission levied by the Bank of England for the convenience of immediate payment in sovereigns to the holder of the gold, instead of his having to wait his turn for coining, and is in no sense a seignorage. On silver a charge is made, and the seignorage is levied on bronze.

In other countries seignorage is relied on to pay part of the expenses of the mint. The rate in France is 6 francs 70 centimes in the kilogramme for gold, and 1 franc 50 centimes for silver, the fineness in each case being '900.

SEINE, the Roman *Seguana*, a large river of France, rises in the hamlet of Envergnans, 3 miles north-west of St. Seine, really in the centre of the department, and on the western slope of the mountains of Côte d'Or, at a spot 1426 feet above the sea. Its course through the departments of Côte d'Or and Aube, in which it passes Clénay-sur-Seine, Beaune-sur-Seine, and Troyes, is generally north-west. On reaching the northern boundary of Aube it receives the river Aube on the right bank, and turns west by south past Nogent-sur-Seine, just below which it enters Seine-et-Marne, where having passed Montcaumon at the junction of the Yonne from the left bank, it winds round to the north-west, and a few miles below Melun enters the department of Seine-et-Oise. Through this department, and till the Seine flows N.N.W. as far as Paris, a little south-east of which it receives the Mure from the right bank. At this point it is from 300 to 500 ft. broad; it afterwards flows in a very winding channel and in a general direction of W.N.W. across the northern part of Seine-et-Oise, where it receives the Oise on the right bank, across the department of Eure, in which it passes L'Isle-Adam, and is joined by the river Eure on the left bank; and into the department of Seine-Inférieure, where it passes Rouen and Havre, opposite which last town it enters the English Channel by an estuary nearly 8 miles wide.

The mouth of the Seine is 260 miles distant from its source in a straight line, but so tortuous is the course of the stream that its whole length is about 480 miles. By means of a lateral canal between Mureilly and Troyes and locks to avoid the fall at Nogent, the river is navigable from Troyes to its mouth, a distance of 370 miles. From Paris to Rouen it is navigated by small steamers and by barges. The port extends as far as Rouen, which city is accessible for vessels of 300 tons. The waters of the river are good and fresh. At Troyes its bed is 446 feet above the sea, at Paris, 51 feet; and at Rouen, only 26 feet. The fact that the water near the mouth of the river flowed over a very stony surface with a depth known to be diminished for centuries, and no longer sufficient for ships of large tonnage, led to the undertaking of important works between Valognes and Quillebeuf, the object of which was to confine the river to a narrower bed by means of embankments. The result has been satisfactory, and there is now a deepened current, and the bed is swept nearly clear of the shifting sands which formerly rendered navigation dangerous. Further works to enable large vessels to reach Paris are now (1886) contemplated. Owing to the windings of the river its navigation is tedious. Steamers ply regularly between Havre, Rouen, and several other towns on the lower Seine, and steamboats of light draught navigate the river at Paris. The articles of traffic on the river include almost every description of agricultural, mineral, and industrial products, home,

foreign, and colonial. The canals of Loing, Orléans, and Brie join the Seine to the Loire; the Yonne unites it with the Saône and the Rhine by the canals of Burgundy and those of the Rhone and Rhine; the Oise connects it with the Somme, Scheldt, and Sambre by the canals of Crozat, St. Quentin, and Sambre; by the Aisne and the canal of Ardennes it communicates with the Meuse; and the canal from the Marne to the Rhine links it to the Meuse, Moselle, and Rhine.

The spring tides in the estuary of the Seine rise 23½ feet in two hours and a half. At these seasons the rapid rise of the tide soon heaps up a mass of water above the surface of the river, which has a gentle fall not exceeding 4 inches a mile from Rouen to its mouth; the consequence is, that a high wave [see BORE] rushes with a tremendous roar and impetuous velocity up the river, causing a reflux in the waters of the Seine, which are pushed back as far as Elbeuf, and sometimes to Pont de l'Arche. The ebb of spring tides continues for nine hours and a half.

The basin of the Seine has an area of about 30,000 square miles. Between Paris and Havre the river forms numerous islands, and flows through some of the richest land and finest river scenery in France.

SEINE, a department in France, formed out of a portion of the old province of Ile de France, and named from the river Seine, which crosses it from south-east to north-west, is bounded on all sides by the department of Seine-et-Oise. Its form is nearly circular; its greatest length is 18 miles; its breadth 16 miles. It covers an area of 117,498 acres, or 183·6 square miles, and had in 1881 a population of 2,799,329. It is the smallest, and, as it contains the metropolis of France, the most densely peopled of all the departments.

General Character.—The surface of the department forming the environs of the capital is covered with towns, villages, villas, and manufactories. It is for the most part level, but is diversified by a few hills, the chief of which, Chantmont and Montmartre, to the north of Paris, rise respectively to the height of 403 and 116 feet above the sea level. Mont Valérien, in the west of the department, is a little higher than Montmartre.

Rivers and Communications.—The district is drained by the Seine and its feeders, the Bièvre and the Marne; it is crossed from the eastward by the Ourcq Canal, which terminates in a fine basin at La Villette, whence the St. Martin and St. Denis canals, which run into the Seine respectively at the arsenal of Paris and a little west of St. Denis, derive their supply of water. The basin at La Villette furnishes most of the fountains and reservoirs of Paris with water. The St. Maur Canal, at the south-east of the Parc de Vincennes, crosses the isthmus of a peninsula formed by the Marne to avoid a very tedious bend in that river. All the great national roads of France, and the great lines of railway, concentrate on Paris.

Surface and Soil.—The principal woods are the Bois de Boulogne on the west and the Parc de Vincennes on the east of Paris, both of which are traversed in various directions by fine drives and walks. All the great roads leading to the capital are lined with two rows of trees on each side, forming in most instances noble avenues.

A large portion of the surface of the department is laid out in gardens, from which Paris is furnished with vegetables, melons, peaches, strawberries, and flowers; wheat, barley, oats, and potatoes are grown in large quantities, considering the smallness of the area of the department. A great number of milk cows, asses, and horses are kept.

Products and Manufactures.—Montmartre and most of the hills consist of accumulations of gypsum; excellent building stone is quarried under the southern quarters of Paris, and at various other points of the department; fine clays for porcelain and pottery, chalk, sand for glass-works, &c., are raised. The industry of the depart-

ment is centred in the capital. [See PARIS.] The department is divided into the three arrondissements of Paris, St. Denis, and Sceaux.

SEINE-ET-MARNE, a department of France formed out of portions of Brie and Gâtinais, divisions of the old provinces of Champagne and Ile de France, and named from its two principal rivers, is bounded N. by the departments of Oise and Aisne, E. by those of Marne and Aube, S. by those of Yonne and Loiret, and W. by those of Loiret and Seine-et-Oise. Its greatest length from north to south is 66 miles, from east to west 46 miles. The area is 2215 square miles; and the population in 1881 was 318,991.

Surface.—The surface presents extensive plains of great fertility, crossed at intervals by ranges of low hills which shut in the basins of several small streams, fed by the Marne or the Seine. The only exception to this general character of the country is the arrondissement of Fontainebleau, which contains a great number of hills of very irregular shape, bare rocks, and large forests. Some of the hill-slopes are planted with vines. The great breadth of excellent grass-land allows of large numbers of cattle and sheep being bred and fattened for the Paris markets. The plains are generally occupied with corn crops, which yield more than enough for the consumption of the inhabitants. The department contains many large forests, the largest is that of Fontainebleau. The banks of the Seine and Marne, in the western part of their course towards Paris, present an almost uninterrupted succession of villages, mansions, and country houses.

Hydrography.—The department is crossed in the south by the Seine, which receives the Yonne and the Loing, swelled by the Lunain, respectively at Montereau and Moret on the left bank; in the centre by the Yèrres, which flows westward into the Seine from the neighbourhood of Provins; and in the north by the Marne and its feeders the Petit Morin, the Ourcq, the Grand Morin (itself fed by the Aubetin), and the Beuvronne. Of these rivers, the Seine, the Marne, the Yonne, and the Grand Morin are navigable. There are three navigable canals, the Canal du Loing, which joins the Seine and the Loire [see LOIRET]; the Ourcq Canal, the main object of which is to convey pure water to Paris [see SEINE]; and the Provins Canal, which renders navigable the little river Vouzie from its source in the rich corn plains of Provins to its mouth in the Seine, near the little town of Bray-sur-Seine. In the central and eastern districts there are some ponds in which vast numbers of fish are bred.

The department is crossed by the Paris-Dijon Railway, which passes through Melun and Fontainebleau; by the branch line from Montereau to Troyes; by the Paris-Strasbourg line, which passes through Meaux; and by several others.

Climate, Products, &c.—The climate is temperate—dry in the south, colder and damper in the north; the prevailing winds are the west, south, and south-west.

The agricultural products include wheat, rye, barley, oats, and buckwheat, of which cereals a large surplus is exported; potatoes, pease, beans, beet-root, and all kinds of pot-herbs; hemp, and various kinds of fruit; and great quantities of hay, grown along the banks of the river for the supply of the markets of the capital. The wine of the department is generally bad, except the *Chasselas* of the environs of Fontainebleau, which is among the best in France. The forests, which cover more than one-sixth of the whole surface of the department, contain chiefly oak, beech, maple, and birch. Fruit trees are cultivated extensively in the west; in the north and east many farms are inclosed by rows of pear and cider-apple trees. In the environs of Provins roses are extensively grown, and are largely employed in perfumery and medicine. Very few horses are reared, those used for farm labour or as roadsters being generally imported from Flanders, Normandy, and Bourgogne. Milk

cows are numerous; veal calves are fed for the supply of Paris; and cheese, known as *fromage de Brie*, is made in considerable quantity. The department has large flocks of sheep of superior breed, and poultry is very abundant.

The quarries of Château-Landon and Nemours furnish beautiful building stone, of which a very large quantity is used. Other mineral products are millstone grit, paving flints, alabaster, limestone, gypsum, potter's clay, and white sand.

The industrial products include writing and printing paper, pottery and porcelain, cotton yarn and painted calicoes, leather, window glass, &c. Glass globes and cylinders of the largest size are made at Bagneux, near Nemours, and also optical and common glass. The commerce is confined chiefly to agricultural produce, wool, cattle, wood, and charcoal for the supply of Paris. The department is divided into the five arrondissements of Melun, Fontainebleau, Meaux, Coulommiers, and Provins. The capital of the department is MELUN.

SEINE-ET-OISE, a department in the north of France formed out of several districts of the old province of Ile de France, and named from its two principal rivers, is bounded N. by the department of Oise, E. by that of Seine-et-Marne, S. by that of Loiret, and W. by those of Eure and Eure-et-Loir. It incloses the department of Seine. Its greatest length from north-east to south is 60 miles; from east to west 50 miles. The area is 2164 square miles, and the population in 1881 was 577,798.

Physical Aspect, Soil, and Products.—The department belongs entirely to the basin of the Seine. With the exception of the arrondissement of Franconville, in the south-east, the surface is undulating; the hills, however, in almost all instances, have a gentle slope, and admit of cultivation to their summit. The country presents cultivated fields, large forests, several palaces and other large mansions standing in inclosed parks, numerous towns and villages, and an immense number of handsome country houses belonging to the opulent citizens of Paris.

The soil in general is not naturally very fertile, but manure is abundant and easily procured on account of the proximity of the capital, and the farming is good, so that all kinds of grain are raised in sufficient quantity to meet the home demand, except oats, which are extensively imported. The breadth of pasture land is not great, but a good deal of excellent hay is made along the banks of the Seine, the Yvette, the Yèrres, and the Oise. Great numbers of milk cows, chiefly house-fed, are kept for the supply of Paris and VERSAILLES, the capital, with a few. Veal calves are fed; sheep are numerous, and of excellent breed. Market-gardening is a profitable occupation, and is carried on extensively. Filberts, walnuts, figs, peaches, apricots, grapes, apples, and other common fruits are abundantly grown. Nurseries and pleasure-gardens are numerous. The wine made is mostly poor. In the north-west of the department, where the vine does not flourish, apples and pears are grown for making cider and perry, the common drinks of the inhabitants of that district. The most important forests are those of St. Germain, Rambouillet, Dourdan, Senart, and Montmorency; they contain chiefly oak, birch, and maple, with some beech, chestnut and hazel. Fish and poultry are abundant.

Hydrography.—The chief rivers are the SEINE, the OISE, and the MARNE, which last and the Ourcq Canal cross the narrow strip of the department between those of Seine-et-Marne and Seine. The district is traversed by several other small rivers, which are turned to advantage in driving mills, bleaching linen, and irrigating the fields. The largest of these are—the Essonne; the Orge, with its tributaries the Remarde and the Yvette; and the Bièvre, all of which enter the Seine on the left bank; the Yèrres, which, crossing the east of the department from Seine-et-Marne, joins the Seine on the right bank, nearly opposite

the mouth of the Orge; the Epte, a feeder of the Seine, which forms the north-western boundary of the department; and the Végie, which carries some of the waters of the western districts into the Eure.

The department is traversed by all the great lines of railway centring on Paris, and by the short lines which connect that capital with Versailles, Corbeil, St. Germain, &c.

Climate, Industrial Resources, &c.—The climate is in general mild and very healthy, but moist, especially in some parts of the arrondissement of Versailles, where the great ponds in which the waters of the Seine are reserved to supply the basins and hydraulic works at the Tuileries, frequently give rise to fogs. The winter is a little longer and colder than that of Paris.

The minerals include only building stone, gypsum, limestone, paving flints, mill-stone-grit, chalk, marl, and potter's and porcelain clay. There are mineral springs at Montmorency and Poissy. Peat is found in the valley of Essonne.

The industrial energy of the department has been greatly developed since 1789, when the gunpowder works of Essonne (now established at Bouchet) and the porcelain and glass works of Sévres were the only important establishments it possessed. The greater part of the inhabitants are, however, still employed in agricultural pursuits, though there are now numerous mills and factories at various parts of the department, producing cotton, flaxen, silk, and woollen threads, calico, cotton and woollen hosiery, paper, leather, chemical products, woollen cloth, soap, oil, refined sugar, porcelain, glass, salt-petre, beer, toys, crinoline, metal manufactures, bricks, &c. The commerce of the district is carried on chiefly with Paris, and consists of the agricultural and industrial products above mentioned. The department is divided into the six arrondissements of Versailles, Mantes, Rambouillet, Corbeil, Pontoise, and Limoges.

SEINE-INFÉRIEURE, a maritime department in France, formed out of several districts belonging to Haute-Normandie, and so named from comprising the lower part of the basin of the Seine, is bounded N. and W. by the English Channel, S. by the embouchure of the Seine and the department of Eure, and E. by the departments of Oise and Somme. Its greatest length from east to west is 76 miles, from north to south 45 miles. The area is 2330 square miles, and the population in 1881 was 814,068.

Surface.—The coast presents for a length of 74 miles, from Tréport to Cape la Heve (on which there are two lighthouses), a wall of chalk cliffs, varying in height from 200 to 700 feet, and broken only by a few rivers, the mouths of which form many small harbours. The chief ports are HAVRE, and DIEPPE, on the English Channel, and ROUEN, the capital, on the Seine. The surface consists of two inclined planes, which intersect in a line of low hills crossing the department from east to west, and slope, one northward to the English Channel, the other southward to the water line of the Seine. These plains, however, present considerable inequalities of surface, especially the parts that form the arrondissements of Rouen, Neufchâtel, and Dieppe.

Hydrography.—The principal river is the SEINE, which receives several small feeders from the right bank. Of the numerous streams that drain the northern plain and pour their waters directly into the sea, the principal is the Bresle, which separates this department from that of Somme.

Soil and Products.—The land is in general good, and the surface presents a pretty picture of fertile fields, forests, picturesque valleys, and hills with well-cultivated slopes, and summits crowned with clumps of trees; altogether about one eighth of the department is covered with forests. The climate resembles that of Sussex, but it is somewhat colder, more moist, and the winters are longer.

Produce and Resources.—Wheat, oats, and other grains

are extensively grown, but not in quantity sufficient for the consumption. Hops, hemp, and flax are also cultivated, the two latter especially along the coast between Fécamp and Havre; the hemp is almost exclusively used for making ropes and fishing-nets. There are fine productive meadows along the Seine, where oleaginous seeds, pease, beans, vetches, tares, turnips, and potatoes are raised in abundance. The department is remarkable for the vast number of its apple and pear trees, which line the roads, surround the fields, and shelter all the villages and farm-houses in the country. Common garden fruits are abundant, and cider is extensively made; but as the climate is too cold for the cultivation of the vine, there are now no vineyards, although a few centuries ago they were abundant. Great attention is paid to the rearing of horses, fat cattle, milk cows, and to the making of butter and cheese, both important articles of export. Sheep are numerous and of good breed; those fed on the downs near the coast supply the mutton named, from the nature of the pasture, *mouton de Pré Salé*, which has a very high repute at Dieppe. The Seine is valuable to fishermen from its abundance of salmon, sturgeon, sole, eels, &c. Large fleets of barks of 30 to 90 tons, and with crews varying from fifteen to thirty in number, are employed in the mackerel, oyster, and herring fisheries.

The minerals comprise marble, building and paving stone, chalk, flint, brick, earth, potter's clay, sand used in glass factories, and marl. Iron mines were formerly worked near Forges. Peat is found. St. Catherine's Hill, near Rouen, abounds in fossils.

Manufactures.—The department is famous for its industrial energy, which is exerted upon the spinning, dyeing, and weaving of cotton, wool, and flax; the manufacture of gingham, cotton cloths, and calicoes of all kinds, broad-cloth, flannel, serge, linen, and mixed cloths of wool and cotton. The principal seat of the cotton manufacture is at Rouen; and Elbeuf is celebrated for its woollen fabrics. Handloom weaving is carried on in almost every hamlet and cottage, and frequently on a pressure of orders the raw material is sent into the neighbouring department to be worked up. Seine-Inférieure is also famous for its bleach-works, which are conducted on the most modern principles, and turn out linen of a purer whiteness than that bleached in any other part of France. The linen woven about Fécamp is of the best quality. The department is traversed by the railway from Paris to Rouen and Havre, the branches of which connect all the important towns.

Seine-Inférieure is divided into the five arrondissements of Rouen, Dieppe, Le Havre, Yvetot, and Neufchâtel.

SEIR-FISH (*Cybius guttatum*) is a fish of the family SCOMBRIDÆ. Twelve species of the genus *Cybius* are known, from the tropical, Atlantic, and Indian oceans. They are coast fishes, 4 or 5 feet long, with the scales rudimentary or absent; the first dorsal fin is continuous, and there are a number of finlets behind the dorsal and anal fins; the tail has a longitudinal keel on each side; the teeth are strong and compressed. The seir-fish is one of the most valuable of the Indian food fishes, its flesh resembling the salmon in firmness and flavour.

SEISMOMETER (Gr. *seismos*, shock; *metron*, a measure), an instrument designed for the investigation of the phenomena of earthquakes. It is the present-day successor of the old *seismoscopes* (shock indicators), which are said to have been in use in the much-disturbed regions of China and Japan ever since the second century of the Christian era; but while the latter only revealed at most the direction of the pulsations, the apparatus of modern physicists is intended to afford also the most precise measurements. The earliest instrument on record, constructed in China about A.D. 186, consisted essentially of a delicately suspended rod, which was so arranged at its extremity as to knock small balls out of holes in an en-

circling cylinder whenever an earth-movement caused it to oscillate; and on noting which balls were displaced, a general idea of the direction of the shock could readily be obtained. Other later investigators have employed a simple wooden pillar, standing upon end, and capable of being upset by slight shaking into a bed of sand, which would prevent rolling when fallen. And another type of instrument, depending upon the change of level of a liquid when displaced, has been modified in quite recent years so as to give tolerably accurate measurements; by using a float, and connecting this over a pulley with a long pointer, Professor Palmieri has obtained interesting results in the neighbourhood of Vesuvius. The most recent apparatus of Japanese and Italian physicists, however, depends upon arrangements of suspended springs for the registration of vertical movements, and of pendulums for lateral thrusts and pulsations; and electricity becomes of considerable service in the attainment of exactitude, in consequence of the facility with which currents are made and broken. An interesting account of the leading modifications of the seismometer will be found in Professor John Milne's treatise on earthquakes in the International Scientific Series (1886).

SEISTAN (called also *Segestan*, a corruption of *Saghistan*, the country of the *saghis*—a species of wood very abundant here) is an extensive level and low-lying tract, situated in the eastern part of the table-land of Iran, on the borders of Persia, Afghanistan, and Baluchistan, now partly included in the Persian territory, but geographically belonging mainly to the Afghan drainage system. It is partly filled by the Seistan or Hamun Lake or swamp, which receives the Helmand, Farah, and other large rivers from the east, and a few insignificant streams from Persia. The basin, however, except in the spring, when the river mouths are swollen, does not form a single expanse of water, but is divided into three depressions fed by the Farah, Helmand, and Zireh. When swollen, the expanse of water is some 70 miles long by 25 broad, with a depth of 3 or 4 feet. The banks are covered with a thick growth of reeds, and the water, except near the river mouths, is brackish. The region is sometimes divided into the two districts of Outer Seistan and Seistan Proper. The first comprises the country stretching along the Helmand, and forming part of Afghanistan. The second has an area of about 980 square miles, with a settled population of about 35,000, and about 10,000 nomads. The country is generally flat, with a sandy alluvial soil, growing shrubs but no trees. There is no lack of irrigation by means of rills and rivulets, and the land is fertile, yielding wheat and barley and excellent pasturage.

The heat in summer in Seistan is more oppressive than at Candahar. For nearly half the year a strong steady wind blows from the snowy mountains which lie to the north. During the prevalence of this wind the days are very hot, but the nights are generally cold. It affects the eyes of the inhabitants, particularly by the dust which it raises, and which is mixed with particles of salt. During the three months of the winter the weather is very pleasant, and similar to that in the north-west part of Hindustan.

Seistan presents many traces of former wealth and civilization. It was devastated and its chief town destroyed by Timur in 1388. The population is probably about 50,000, mostly Tadjiks. The country was visited by Foster in 1788, by Christie in 1810, by Connolly in 1839, and by General Ferrier in 1864.

SEJANUS, AELIUS, the notorious minister of the Emperor Tiberius, was of Etruscan birth, and the son of a general of the Praetorian Guards. Eventually he rose to the sole command of this fine force, and as this office attached him constantly to the emperor's person, he used the position to insinuate himself into the intimate confidence of Tiberius. His power was as great as that of Wolsey or

Thomas Cromwell under our own Henry VIII., and he was as blindly trusted during his time of favour as they were. He was so intoxicated with the enormous force he wielded that he began secretly to aim at the imperial power. He caused Drusus, the only son of the emperor, to be poisoned, A.D. 23, having conducted an intrigue with the wife of the unhappy prince for this object. At the same time he loaded the emperor with attentions, and once saved the life of Tiberius at some risk to his own. When Tiberius retired to the island of Capri, he left Sejanus in complete confidence at Rome, therefore, and the latter thought the time for his design had at last come. The mother of the emperor mysteriously died (A.D. 29), and those nearest relatives of the emperor who might become claimants to the throne, and were resident in Rome, were banished (A.D. 30). At last, even Tiberius came to see the danger, and swiftly deposing Sejanus from his military command, sent a message to the Senate tersely setting forth his suspicion of the minister's treasonable designs. The Senate, long aware of what the emperor had so tardily learned, decreed the instant execution of Sejanus, and this took place with every form of popular insult, for his cruelties had made him the object of universal execration. His friends and family shared his fate (A.D. 31).

SELACHOIDÆI. See SHARK.

SELAGINÆÆ is a small order of plants belonging to the group *GYMNETALE*. About 140 species are known chiefly from South Africa, though one species (*Globularia*) is European, and another (*Gymmandra*) occurs in Central and Northern Asia. They are herbs or small shrubs, with simple, usually alternate, leaves, and small white, blue, or rarely yellow flowers, solitary or in terminal heads or spikes. The flowers are generally irregular, and with large bracts; the calyx is persistent, gamosepalous, five to three toothed or partite; the corolla is hypogynous, gamopetalous, and deciduous, with a spreading four to five lobed limb; the stamens are four or only two, inserted on the corolla tube, the ovary is superior, two-celled, with one pendulous, anatropous ovule in each cell. The fruit is composed of two achenes, free when ripe.

SELAGINEL'IA. See LYCOPODIACEÆ.

SEL'BY, a town of England, in the county of York, situated 15 miles south-east of York, and 193 miles from London. The Ouse, which is navigable hence, is crossed by two bridges, one of which is a railway swing bridge. There is a market-cross, town-hall, Roman Catholic church, and several dissenting places of worship. The parish church is the centre of interest. It is a portion (almost the only one remaining) of Selby Abbey, founded by William the Conqueror in 1069, in which Henry I. was born. It is a large and magnificent cross church, of mixed Norman and Early English architecture. The choir is a most beautiful specimen of decorated work; the east end is peculiarly fine, with very beautiful windows and octagonal turrets, having rich pinnacles. It has some very superior stone screen-work and ancient stained glass. The population in 1881 was 6033.

SEL'DEN, JOHN, scholar, lawyer, and member of Parliament under the earlier Stuarts, was born at Salvington, Sussex, 16th December, 1584, and died in London, 30th November, 1654. He was educated at Oxford, was called to the bar, and became a member of Ben Jonson's literary club. His earliest work, the "*Analecton Anglo-Britannicum*," on historical records (1615), was written in 1606. He also published "*England's Epinomis*," "*Uni Anglorum Facies Altera*," and "*The Duello, or Single Combat*" (1610), law treatises; "*Titles of Honour*" (1614); "*De Deis Syriis*," an inquiry into polytheism (1617); and a "*History of Tithes*" (1618). In the last-named work he discussed the divine right of the clergy to receive the tithes, and was obliged to make a public acknowledgment of his regret at having done so. In 1621 he underwent a brief

imprisonment for advising the Commons to insist upon certain privileges in dispute between themselves and the crown; and in 1625, being then a member of Parliament, he took part against the royal favourite, the Duke of Buckingham, whom, in the succeeding Parliament, he aided in impeaching. From 1629 to 1631 he was imprisoned in the Tower on a charge of sedition. He had meanwhile produced a variety of works, including his "Marmoræ Arundeliana" (1629). In 1635 appeared his "Mare Clausum," in answer to the "Mare Liberum" of Grotius, in the contest about the Dutch fishing-rights in English waters. In the Long Parliament he was elected in 1610 for the University of Oxford. He sat on the committee of the Lower House which undertook the proceedings against Strafford. Though the friend of Laud, he was nominated by the House to frame the articles of impeachment against the archbishop. But while in favour of constitutional liberty, Selden was scarcely less opposed to the violent proceedings of the extreme Puritans than to those of the court. Subsequently he was keeper of the records in the Tower, and in 1616 Parliament voted him a sum of £5000, in consideration of his eminent services and of his imprisonment. Nevertheless, when it became apparent that the struggle between the Crown and the Commons could have no peaceful issue, he gradually withdrew from political life. He died at the house of the Countess of Kent, to whom he is said to have been married. He is now best known by his "Table Talk," published in 1689 by Richard Milward, his amanuensis. An edition by S. W. Singer was published in London in 1869. Whitelocke, his biographer, Wilkins, Baxter, and Clarendon, all bear testimony to the excellence of Selden's character and the extent of his erudition. Clarendon, who was his intimate friend, says, "Mr. Selden was a person who no character can flatter or transmit in any expressions equal to his merit and virtue."

SELENE, the moon goddess of the Greeks, that is, the moon personified, not to be confounded with Artemis (Diana), though the later poets identified them. The essential distinction is the same as that between Helios (Sol) and Apollo. Selene was a Titan, daughter of Hyperion and Thia; and was by no means the fiercely celibate goddess that Artemis was. Her loves with the shepherd Endymion were very improperly attributed to Artemis by late poets; but no one ever dared to charge the "queen and huntress, chaste and fair," with Selene's fifty daughters by Endymion, or her several children by Zeus. Under the corresponding name of Luna she was also worshipped at Rome.

SELENITE (Gr. *selênê*, the moon) is crystallized sulphate of lime, so called from its peculiar opalescent lustre. It occurs chiefly in clayey rocks, the well-known tabular crystals being especially abundant in the Eocene clays around London, in the TRIASSIC FORMATION of other areas, and, in fact, in nearly all deposits of an aluminous character. The mineral is comparatively soft, and readily splits into thin plates; and when it can be obtained in sufficiently large masses, it is sometimes used—as by the Indians of South America—as a substitute for glass. It is also employed by the physicist in investigations with polarized light. Massive and slightly crystalline varieties are known as ALABASTER and gypsum.

SELENIUM is a non-metallic element closely allied to sulphur, and often found associated with it in minerals and other deposits. It was discovered by Berzelius in 1817, in the refuse from the manufacture of oil of vitriol from iron pyrites. It is usually found in small quantities, but widely distributed. It occurs native in the free state in Mexico; and is also found as a selenide of cadmium, copper, cobalt, iron, nickel, lead, silver, and mercury. It is often found in native sulphur, and in Swedish and Bohemian iron pyrites. The principal sources are the octaval selenides of lead and copper from the Harz, and

the deposit in vitriol chambers where the sulphur or pyrites burned contains selenium. It occupies an intermediate place between sulphur and tellurium; the atomic weight is 79, the symbol Se. Like sulphur, it has different allotropic states, and may be obtained either amorphous or crystalline. That obtained from selenhydric acid by electrolysis, or electro-negative selenium, is amorphous, and soluble in bisulphide of carbon. That obtained in the same manner from a solution of selenious acid, or electro-positive selenium, is also amorphous, but it is insoluble in bisulphide of carbon. Amorphous selenium is of a deep brown colour, and melts at 100° C. (212° Fahr.); in thin sheets the colour is deep red. The specific gravity is 4.3. It is a brittle solid with a glassy fracture. When this form of selenium is heated for some time above the melting point, it passes into the crystalline state, and the allotropic change is accompanied by great evolution of heat. In this form it has a bluish-gray metallic lustre, and is quite insoluble in bisulphide of carbon. Selenium deposited from solution in this solvent is also crystalline. It boils below a red heat, and condenses in reddish-black drops. It is insoluble in water, but is slightly soluble in oil of vitriol. When heated in the air it burns with a blue flame, forming selenious acid, and emitting an odour of stale horse-radish.

The only well-known oxide of selenium is the dioxide or selenious oxide (SeO₂), which is obtained by burning selenium in a stream of oxygen. It is a white mass, which rapidly absorbs water and produces selenious acid (H₂SeO₃). This acid may also be obtained from selenium by the action of nitric acid. It crystallizes in large prismatic colourless crystals, which absorb water, but which effloresce in dry air. It is reduced by sulphurous acid, the selenium being deposited in the red amorphous form. Sulphydric acid throws down a yellow precipitate, consisting of selenium and sulphur. It is a powerful acid, and being dibasic forms neutral and acid salts, having the general formula M₂SeO₃ and HMS₂SeO₃, and called selenites. None of these are of any importance.

Selenic acid (H₂SeO₄) is known only in aqueous solution. It is an analogue of sulphuric acid, and is obtained by fusing selenium with potassium nitrate. In the most concentrated form it is a colourless liquid, boiling at 280° C. (536° Fahr.), and having a specific gravity of 2.6. It resembles oil of vitriol in appearance and properties, and, like that body, gives rise to considerable heat when diluted with water. If further concentrated it decomposes into selenious acid, oxygen, and water. It is dibasic, and forms acid and neutral salts, having the general formula, MHS₂SeO₄ and M₂SeO₄, and called selenates. Most of these salts resemble the corresponding sulphates.

There are two sulphides of selenium, the disulphide or selenious sulphide (SeS₂), an orange-yellow substance, and the trisulphide or selenic sulphide (SeS₃), a brick-red, fusible, and volatile body. There are two chlorides of selenium—the dichloride (Se₂Cl₂), a yellow oily liquid, and the tetrachloride of selenium (SeCl₄), which sublimes in yellow crystals. All compounds containing selenium, when heated before the blowpipe on charcoal, give off the characteristic odour of horse-radish. The solutions are precipitated by sulphydric acid, selenium being thrown down. All the selenides heated with acids give off selenhydric acid gas or selenetted hydrogen (H₂Se), an inflammable gas of most offensive and unmistakable odour, and which precipitates most of the metallic salts.

SELEUCIDÆ. See SELEUKOS.

SELEUK'OS, founder of the great dynasty of Syrian kings, called after him *Seleukeidai* (Lat. *Seleucidæ*), was a distinguished officer of Philip of Macedon and of his son Alexander the Great. He accompanied Alexander into Asia, and became so powerful that after Alexander's death (323), at the final partition of the huge empire, he was able to obtain Babylonia for himself. The assumption

of superior suzerainty by Antigonos, another of the Alexandrine monarchs, drove Seleukos (316 B.C.) to Egypt and elsewhere for help, and a coalition against Antigonos was formed, which was eventually considerably successful. Seleukos returned in triumph to Babylonia (B.C. 312), and his reign is usually reckoned from this date. He occupied the next few years in perpetual petty conquests, resulting on the whole in large additions to his territory; and when, in 306, Antigonos of Asia and Ptolemy of Egypt assumed the title of king, Seleukos followed their example. Soon afterwards he took the chief part in the final struggle with Antigonos; and on the defeat and death of the latter at Ipsus in B.C. 301, and the division of his kingdom, Seleukos received a great part of Asia Minor and all Syria. He now ruled from the Mediterranean to the banks of the Indus, that is (excepting the part of Asia Minor held by his fellow-adventurer Lusinachos, king of Thrace), all the known part of Asia; and his kingdom was by far the largest of those of the Alexandrine generals. In the troubles arising through the ambition of Dêmétrios, king of Macedonia (son of Antigonos), Seleukos was followed by his usual good fortune, and when Dêmétrios (who was his father-in-law, though a much younger man) fell into his hands as a prisoner, in 286, Seleukos treated him with great kindness. Demetrios died in honourable captivity B.C. 283. His daughter Stratonikê (Lat. *Stratonice*), who, when very young, became the wife of Seleukos, had some years before been divorced, so that she might marry the old king's son Antiochos, who was dying of love for her. This generous behaviour of Seleukos towards his queen and his son was a favourite subject with ancient painters and poets. In B.C. 281 Seleukos fought his last great campaign against his old ally Lusinachos of Thrace, and defeated and slew him. He was now monarch of all Asia. But the tottering throne of Macedon tempted him, aged though he was, and the old warrior of seventy-eight crossed into Europe intending to grasp the prize. Ptolemy king of Egypt had chosen as his heir his second son (Ptolemy Philadelphos), and the eldest son (Ptolemy Keraunos) had attached himself to the train of Seleukos, who received him into great favour. With incredible baseness he assassinated his protector, B.C. 280, and seized Macedon for himself.

Seleukos, great conqueror and administrator though he was, sowed the seeds of the downfall of his kingdom. Instead of adopting the plan of Alexander, of largely accommodating his government to the ideas of his subjects, Seleukos was above all a Greek, and bent his great powers towards the complete Hellenization of Asia. His towns of Antioch and Seleukeia were long among the greatest cities of the world. As a result, when once his own firm hand was removed, revolt after revolt succeeded, and eventually kingdom after kingdom was founded at the expense of Syria, until (B.C. 79) Tigranês, king of Armenia, overthrew the remnant and annexed it to his own state. At his defeat by Pompey the Great, Syria became a Roman province B.C. 64. The succession of the earlier Seleukids was as follows:—Antiochos I., son of Seleukos, 280 B.C., fell in battle against the Gauls; Antiochos II., son, 261 B.C., murdered by his wife Laodikê, whom he had divorced and afterwards remarried. (During this reign the kingdoms of Parthia and Bactria were founded.) Seleukos II., Kallinikos, son, 246 B.C., driven from his kingdom for a time by Ptolemy Euergetês; Seleukos III., Keraunos, son, 226 B.C.; Antiochos III., the Great, brother, 223 B.C. (During this reign Syria first came into collision with the Romans, who defeated Antiochos. He was the protector of Hannibal.) Seleukos IV., son, 187 B.C.; Antiochos IV., Epiphanês, brother, 175 B.C., persecutor of the Jews and antagonist of the Maccabees, died raving mad 164 B.C. After this king the power of the monarchy greatly declined, and it is therefore not necessary to continue the list.

SELF-DENYING ORDINANCE, an important measure passed through Parliament on 3rd April, 1645, which provided that no member of Parliament should hold any civil or military office or command conferred by either or both of the Houses, or by the authority derived from them. This necessitated the resignation of Essex, Manchester, and others of the more timorous of the Parliamentary leaders, and eventually contributed to the success of the Parliament in their protracted struggle with Charles I. Notwithstanding the ordinance, the Parliament retained Cromwell himself in his command, under what was called the *New Model*, an Act passed side by side with the Self-denying Ordinance for the purpose of remodelling the army.

SELIM I., Emperor of the Turks, the son of Bayezid or Bajazet II., was born in 1467. Being governor of Trebizond in 1511, he revolted against his father, and marched to Constantinople. Though defeated, the janissaries and the spâhis being in his favour, his father Bajazet was compelled to resign, and he was accordingly proclaimed emperor 23rd May, 1512. His first step after his accession was to march against his eldest brother Ahmed, who was at the head of some troops in Asia. He defeated and put him to death. He next invaded the dominions of Shah Ismail, king of Persia, who had espoused the cause of Ahmed; defeated him in a pitched battle, and took Tabriz, the capital (September, 1514). After annexing Diarbeki to his empire, and recovering Bosnia, which had been occupied by the Hungarians, Selim in 1517 turned his arms against the Sultan of Egypt, and having made himself master of Egypt, as well as Syria, returned to Constantinople, where he made a vow not to lay down his arms until he had subdued the whole of Persia. Death, however, prevented the execution of this project: he was attacked by a disease which terminated his life, 22nd September, 1520. Though of a cruel and ferocious disposition, he was endowed with a strong intellect, and his administrative powers were considerable. He repressed the residence of the janissaries, constructed the arsenal of Pera, and laid the foundation of a regular navy. But the most important act of Selim was his procuring the nomination as Imam from the last wretched caliph of the Abbasids who lingered in Egypt; so that the Ottoman sultan became for ever after entitled in a shadowy manner to the headship of Islam, and could with a show of reason call himself the successor of Mohammed and commander of the faithful.

SELIM II., Emperor of the Turks, succeeded his father Solomon the Magnificent in 1566. The principal events of his reign were the suppression of a rebellion in Yemen (1568-70), the capture of Tunis and La Goleta from the Spaniards, and the conquest of Cyprus, which was taken from the Venetians in 1571. In the same year was fought the naval battle of Lepanto, in which the Turkish navy was almost annihilated by Don John of Austria. Notwithstanding this success, the Venetians in 1574 were obliged to make peace upon very disadvantageous terms. During the remainder of Selim's reign the affairs of the Ottoman Empire were prosperous. He died 12th September, 1574, and was succeeded by his eldest son Murâd.

SELIM III. was born in 1761. On the death of his father, Mustapha III., Abdul-Hamid, the brother of Mustapha, ascended the throne, and Selim was placed in confinement until his uncle's death in 1789, when he became sultan. By his institution of great reforms in the state and army he excited the fanatical bigotry of the clergy, who provoked a rebellion against him. In 1807 he was deposed by Mustapha IV., the son of Abdul-Hamid, and in July, 1808, was strangled by his order. The usurper was himself almost immediately afterwards deposed, and succeeded by Mahmud II.

SELINUS, or more correctly *Selinountion*, one of the most important towns in ancient Sicily, was a Dorian colony, founded B.C. 628. It stands near the rivers Hypsa and

Selinos, on the southern coast of the island, where the wild pansley (*Selinus*) grows abundantly. It was taken by Carthage, B.C. 409, and all that were left of its inhabitants were sold into slavery: 16,000 had fallen in the siege. After this time it never rose to its former prosperity; but splendid ruins of antique temples remain to attest the truth of the accounts of ancient writers. The archaic sculptures found in these ruined temples are of the highest possible value in the history of art, though ugly enough in themselves. Of the six temples none is later than the fifth century B.C., and the oldest is probably almost coeval with the original settlement in 628 B.C. We have here therefore the earliest known monuments of Doric architecture and sculpture. Moreover one of these temples is the largest work of its kind, measuring 360 feet by 182. See the article and the first Plates of SCULPTURE.

SELJUKS or SELJUKIANS, a dynasty originally Turan, and descended from a chieftain named Seljuk. They settled first in Bokhara, whence they made their way into Khorassan; and afterwards, under the name of the Iranian, Kermanian, and Rumi dynasties, governed great part of the south of Asia.

Seljuk was the son of Dekuk, one of the bravest and most trusted officers of Bagu, chief or khan of the Hodi-the Tartars, who inhabited the plain north of the Caspian. This prince brought up Seljuk from his boyhood; but afterwards, for some offence, banished him from his territories; and Seljuk in consequence settled in the neighbourhood of Samarkand and Bokhara, where he laid the foundation of a small state. He also embraced Mohammedanism, and is said to have been killed, at the age of 107, in a skirmish with the pagan Tartars on the frontiers of the Mohammedan Empire. Seljuk left three, or, according to others, four sons; but the most influential members of his family were his two grandsons, Mohammed or Togrul Beg, and Daoud or Giasur Beg. Oriental historians differ as to the passage of the Seljuk family into Khorassan, some of them placing this event in the reign of Mahmud of Ghaznee, and others in that of his son Masoud. It appears certain, however, that Abu Taleb Mohammed Rezzeddin, and also Togrul Beg, was crowned at Nishapur, A.D. 129 (A.D. 1038), being the first of the Iranian dynasty of the Seljuks. The conquest of Nishapur was followed by that of Herat and Merv, and shortly after of nearly the whole of Khorassan. The whole of the reign of Togrul Beg (twenty-six years) was occupied in wars with the sultans of the Gaznevid dynasty, and in successive conquests of the provinces of Persia; and on his death, and that of his brother Giasur Beg, the sovereignty devolved upon the son of the latter, Alp Arslan, 1063.

About the year 1225 the Seljuks became tributary to the Mongols, who summoned them to do the most servile homage, deposed and set them up, and even put them to death at their pleasure. Out of the wrecks of this empire arose that of the Ottomans, or Turks, founded by Othman, a Seljuk captain.

SELKIRK, an inland county of Scotland, bounded N. by Edinburghshire, E. and S.E. by Roxburghshire, S. and S.W. by Dumfriesshire, and W. and N.W. by Peeblesshire. A small detached part of the county lies just beyond the eastern boundary, entirely surrounded by Roxburgh. The form of Selkirk is very irregular. Its greatest length S.S.W. to N.N.E. is about 28 miles; the greatest breadth, at right angles to the length, is about 17 miles. The area is 260 square miles. Conjunctly with Peebles the county returns one member to Parliament. The railway communication belongs to the North British system. The population in 1881 was 25,564.

Surface, Geology, and Rivers.—The whole county is hilly, but especially the southern and western parts, which are the highest, the direction of the principal streams being from south-west to north-east. The hills, which

are generally ridge-shaped and rounded on the tops, vary in elevation from a few hundred feet to 2000 feet. They originally appear to have formed one large and elevated bed of graywacke and clay slate, which is now cut by the larger streams into longitudinal divisions, and cross-cut by the smaller streams to a less depth, and into smaller and rounded divisions. On the western side of the county, towards Peebles, porphyry alternates with thin strata of slate and granite.

Selkirk is comprehended in the basin of the Tweed. That river passes through the county in the northern part, from west to east, quitting it just at the junction of the Gala, which may be regarded as the lowest spot of the county, 280 feet above the level of the sea. About 10 or 12 miles of the course of the Tweed belong to Selkirk. The Ettrick may be regarded as especially the county river; it gave to the district the name, by which it was formerly known, of Ettrick Forest. Its banks, and those of the tributary streams, are finely wooded, but the extensive forests which once prevailed have wholly disappeared. The scenery, however, is of a richly picturesque character, and has suggested many of the most popular Scottish songs. It has been described with much vigour by James Hogg, who loved to call himself the "Ettrick Shepherd," and under that well-known title figures in the "Noctes Ambrosianæ." The river rises in the south-west corner, and flows in a tolerably direct course north-east till it joins the Tweed on its right bank, on the frontier of the county a little above Abbotsford; its course may be estimated at from 28 to 30 miles. The Yarrow rises on the west, and has its course nearly parallel to the Ettrick, until it reaches Yarrow Ford, where it turns to the south-east and joins the Ettrick a little above Selkirk; its course may be estimated at about 20 miles, including the loch of the Lowes and St. Mary's, through which it flows. The Gala Water, which has the greater part of its course in Edinburgh, and the Cawder, belong to the northern part of the county; they flow south-east and join the Tweed on the north bank.

The principal lochs are that of the Lowes and St. Mary's, separated from each other by a very narrow neck of land. They are both expansions of the Yarrow.

Agriculture.—The arable land of the county lies at an elevation of from 280 to 800 feet, and the climate is therefore cold and variable. Wheat is grown in the lower districts, and has been raised at the height of 700 feet, to what would be called a good crop in the Lothians; and, considerably higher, near the head of Ettrick, oats, turnips, barley, and clover hay are cultivated in regular rotation.

The quantity of land constantly or occasionally under tillage is, however, very small, and the dampness of the climate renders the county altogether more appropriate for pasturage.

The cattle are chiefly of the Teeswater breed, or rather are a mongrel kind of the Short-horned varieties, of which a considerable number are reared annually. Many Highland cattle are also grazed on the hills, where they consume the coarse pasturage which the sheep will not touch. Of sheep the Cheviots are the most abundant, but the black-faced breed are kept on exposed mossy lands, where they are found to thrive best. Some Leicesters have been also introduced.

History.—This part of Scotland appears to have belonged originally to the Gadeni, and in the period which succeeded the retreat of the Romans was overrun by the Anglo-Saxons of Northumbria. After the cession of the southern districts of Scotland by the Anglo-Saxon princes, the Scottish kings had a residence at Selkirk, anciently written *Se'elchyrche*.

Selkirk contains but few antiquities. At Philiphaugh the Royalists, under Montrose, were defeated by the Covenanters, under Leslie.

SELKIRK, the capital of the above county and a royal burgh, stands on a rising ground on the right or eastern bank of the Etrick, and overlooks the famous battlefield of Philiphaugh, which proved so disastrous to the hopes of Charles I. It is 40 miles S.S.E. of Edinburgh by the North British Railway. It has been considerably improved of late years, and carries on an extensive trade in hosiery, tweeds, and blankets. A large number of new and improved houses have been built, and the wool-spinning and tweed mills alone employ a large number of persons. In 1876 an improved system of drainage was carried out. Visitors resort to it as a convenient point from whence to explore the localities hallowed by the genius of Scott, Hogg, and Wordsworth, such as the Yarrow, the Forest, Abbotsford, Dryburgh, and Melrose Abbey. It contributed 100 men to the army of James IV. which perished at Flodden, and its historical associations are neither few nor uninteresting. The church is a spacious edifice, dating from the early part of the fifteenth century; the town-hall has a spire 110 feet high; and there are monuments to Mungo Park, the African traveller, who was born near the town, and likewise to Sir Walter Scott. There are county buildings, a chapel of ease, a Free church, two U.P. churches, and an Episcopal and Roman Catholic church. In 1877 the former wooden railway bridge over the Tweed was rebuilt of iron. The burgh is governed by a provost, two bailies, a dean of guild, a treasurer, and ten councillors. The population in 1881 was 6090.

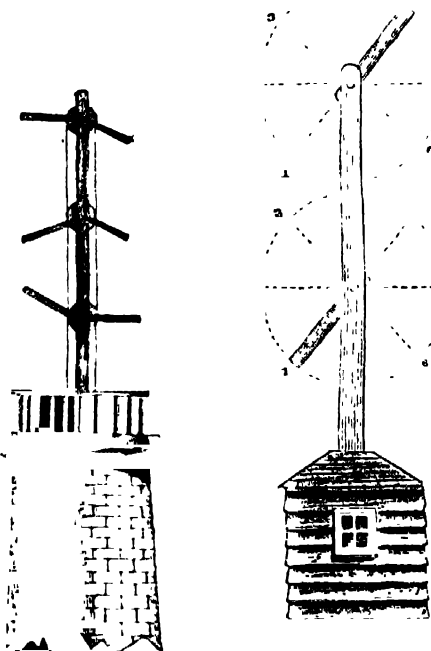
The town itself and the name arose from a *sele-chyrche* built for the king's use while hunting in the Etrick Forest. It was annexed to a monastery founded by David I. in 1113. The town was formerly so famous for the manufacture of a kind of shoe that all the buigesses were called "souters" (shoemakers).

SEL'KIRK, ALEXANDER, the original of Defoe's celebrated character of Robinson Crusoe, was born at Largo, in Fife, in 1676. At an early age he showed an inclination to follow a seafaring life; and having been cited in August, 1695, to appear before the session for laughing in church, he ran away to sea to escape the disgrace with which he was threatened. Having engaged in some half-piratical, half-exploring voyages in the American seas, he quarrelled with his captain, a ferocious ruffian named Staddles, by whom, in September, 1704, he was set on shore on the uninhabited island of Juan Fernandez, with a few books, his nautical instruments, a knife, boiler, axe, gun, powder and ball, for his whole equipment. After four years and four months' residence, he was rescued by an English vessel, commanded by Captain Woodes Rogers, the commander of another buccaneering expedition, who visited the island to take in water, in June, 1709. Rogers made him his mate, and he returned to England in 1711, with £800 for his share of the booty taken from the Spaniards. He went to sea again in 1717, and ultimately became a lieutenant of H.M. ship *Weymouth*, on board of which he died in 1723. It is said that he gave his papers to Defoe, who derived from them the story of "Robinson Crusoe;" but Defoe could have borrowed little beyond the mere idea of a man being left alone on a desert isle, there being scarcely anything common to the adventures of the real and fictitious solitary.

SELTZER WATER (more accurately *Selters Water*) takes its name from the village of Lower Selters, near Limburg, in Prussia, where this well-known mineral water is obtained from several copious springs. Owing to its containing carbonate of soda, carbonic acid, and common salt, it is useful in chronic disorders of the respiratory, digestive, and urinary organs. About 1,500,000 bottles are annually exported. It was discovered early in the sixteenth century.

SEMAPHORE (Gr. *sema*, a sign, and *phero*, to bear). Before the invention of the electric telegraph, signals of

all sorts had to be given either by sight or sound. For this purpose torches and flags had been in general use, and in many cases, as of ships interchanging signals, and of armies manœuvring in the field, some such signals must still be used. Semaphores were first established by the French in 1794, as a plan for conveying intelligence from the capital to the armies on the frontier. The invention was due to Chappe, who called it a *telegraph*; the term semaphore was of later date. As adopted in England in the following year semaphores consisted of towers built at intervals of from 5 to 10 miles on commanding sites. On the top of each tower was a telegraphic apparatus, comprising



Semaphore of 1796.

Later Semaphore (up to 1847)

six shutters, by the opening and shutting of which, in various combinations, sixty-three distinct signals could be formed. This complicated machinery was soon superseded by a mast with two arms, similar to our present railway signals; and by placing these arms in various positions, a great variety of signals was obtained. Inside the tower was a lookout room commanding a good view of the next semaphore station, and from this room the arms were worked. Even with this clumsy system of telegraphy great rapidity was secured. For instance, noon was signalled from Greenwich to Portsmouth and the signal acknowledged in a minute and a half.

SEMELE, in the Greek mythology, was a Theban princess, the daughter of Kadmos (Lat. *Cadmus*) and Harmonia. Zeus saw and loved her, and the amour was discovered by Hera. To destroy her rival, the latter, in disguise, insinuated into the mind of the princess an ambition to see her lover in all his splendour. This Semele asked, having first coaxed Zeus into promising before and to grant her request. He, horrified, sought to dissuade her from her rash resolve, but he failed, and mournfully carried out his promise. As he had foreseen, the first flash of the lightning which began to play around his form killed his beloved Semele. Zeus took from her body the child Dionysos, and carried it in an incense in his own thigh till due time. When Dionysos came to his power as a god he brought forth his mother from the shades and enthroned her in Olympus, under the name of Thyonè.

Recent investigations of English scholars (1885) have shown that this myth is Phœnician in origin, and is found in Assyrian records, where the name of the goddess is Samelâ. Here she is evidently the goddess of the wine-grape, consumed by the fierce heat of the sun while giving birth to the wine-god. In Genesis xxxvi. 37 we find an Edomite king Samlah, named, in accordance with Edomite practices, after the goddess, and he comes, we are told, from Masrekah, that is, "the wine-land." Many passages in Kings and Chronicles are much clearer if we preserve the word *samel*, now translated "idol" (as in 2 Chron. xxxiii. 7, 15), and regard this as the male form of the Phœnician Samelâ.

SEMI, the Latin prefix meaning "half," is attached to many words in ordinary English use.

SEMIBREVE, SEMIQUAVER. See **NORVION** or **MUSC**.

SEMICHORUS, a term used to signify the division of a chorus into two parts (not necessarily of equal size, however), for the sake of antiphonal effects. The two "sides" of a cathedral choir give in analogous arrangement.

SEMICIRCULAR CANALS. See **LARI**.

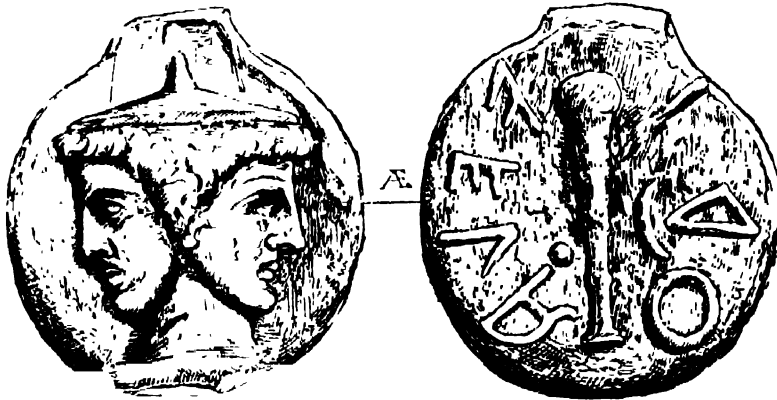
SEMILUNAR BONE. See **HAND**.

SEMILUNAR VALVES. See **HEART**.

SEMIAMIS, a queen of Assyria, who, according to some, reigned about 2000, or, according to others, about

1250 B.C. Her whole history, as it has come down to us, is a mass of fables, which absolutely refuse to fit in anywhere in the history of Assyria. The ample records of that country preserved to us on stamped brick, are silent as to such a queen. The Greek legend tells that she was the daughter of a goddess, and after many adventures was married by a general of Ninos, first king of Assyria and builder of Nineveh, called after him. Later on she became the wife of Ninos, and on his death, which she was not without suspicion of having caused, she succeeded to the throne, though Ninos left a son, Ninuas. She is said to have built Babylon, and to have adorned it with numerous great and useful works; but the chronology of Herodotus is hopelessly wrong, for he makes Semiramis live about two centuries before Cyrus the Persian. Semiramis is said to have conquered the greater part of Libya and Ethiopia, and to have fought with an Indian king on the Indus. All that we can collect from these stories is that tradition assigned to a King Ninos and to a masculine woman, Semiramis, the foundation of the Assyrian monarchy. The tales of the voluptuous character of Semiramis resemble those of Catharine II. of Russia in our own times. These seem to point to a connection with the Semitic goddess Astarte. The whole subject is quite obscure.

SEMI'SIS (Lat. *semi*, half, and *as*), the Roman coin of the half-as. A specimen of the consular semissis is



Etruscan Semissis.

shown in Plate II., COINS. Above is a very fine Etruscan specimen, cast of copper from the mines of Monte Catini. On the obverse side is the effigy of Janus or Hermes (both young faces capped by a petasus); on the reverse, *Idathri*, with a club and crescent moon. It is of the natural size.

SEMITIC SHEMITIC RACES include the Assyrians, Chaldeans, Syrians, Arabs, Hebrews, Samaritans, Abyssinians, Phœnicians, and Carthaginians; that is to say, they were the races inhabiting the broad neck of land connecting the three main continents, and comprising Mesopotamia, Syria, and Arabia. Carthage was an offshoot from Syria, Abyssinia an offshoot from Arabia.

Dr. *Semitic Languages* describes the languages of certain nations which possess similarity of structure, just as the Brahminical languages of India, the Persian, Armenian, Greek, Latin, Slavonic, Germanic, and Celtic tongues exhibit another important group—commonly known as Aryan or Indo-European—also possessing peculiar and distinctive features, clearly different from those of the Semitic tongues. Some of the Aryan languages have given rise to secondary languages, and especially the Latin language, now dead, which reckons Italian, French, Spanish, Portuguese, and some others, as its still living children. These secondary Latin tongues are collectively called Romance languages. The relation of the

Semitic tongues to one another is much more the interrelation of the Romance tongues than that of the separate Aryan languages. They spring apparently from the common speech, and the honour of the original speech has been claimed for nearly all of them at one time or another. All theories are at present discredited; the utmost one can say is that Hebrew is in many respects more ancient than Arabic, but that neither of these, nor even Assyrian, is the original Semitic tongue. Further, while the Aryan races are really branches of one stock, all the Semitic races are certainly not. In fact the term sadly needs replacement by a better one, since it sins doubly against the truth; for, first, some of the languages now under consideration are spoken by nations which the Bible declares to be descended from Ham, not Shem, as, for example, the Phœnicians; and secondly, many undoubted descendants of Shem, following the Bible record, do not speak a Semitic tongue. Some scholars have suggested Arabic as a better term, but this is manifestly worse than Semitic.

The striking difference between Semitic and Aryan speech lies in the fact that whereas in the latter family (of which our own tongue is one member) vowels and consonants play their part in the formation of the roots of words, in Semitic speech the vowels are quite subordinate (even to the point of having been neglected in Hebrew writings, so that the tradition of their actual sound has

been lost altogether in that language), and the roots are formed, to a preponderating extent, of three consonants, whence this peculiarity is termed that of *triliteral roots*. These three consonants develop frequently, by addition to the original root, to five. The next great point is that while the Aryan tongues develop the various meanings of a word, the persons and tenses of a verb, cases of a noun, &c., by inflexion or the use of suffixes and auxiliaries, and leave the stem of the word fairly unaltered, as, I love, love-d, will-love, am-lov-ing, he love-s, &c.; the Semitic tongues accomplish these changes almost wholly by a change of vowels, the three consonants alone remaining unaltered. Of course the power of flexion thus gained is limited, and in consequence as thought advances in complexity supplementary syllables are prefixed or suffixed to aid in defining the new sense of the word desired; but after all, the number of these prefixes or suffixes is quite small. The structure of these languages is of the poorest; two genders, masculine and feminine; two tenses, completed and incomplete actions; practically no cases, &c. The juxtaposition of two words is held enough to convey the idea of a genitive case. Present and future are not distinguished save by the context. Conjunctions, the grouping together of clauses, the interdependence of sentences, &c., are almost wanting. Semitic style is bald to a degree—it leaps from assertion to assertion. It is like reading by flashes of lightning. Pictorial epithets of great vividness adorn its favourite mode of expression.

The richest of all Semitic languages is the magnificent tongue of Arabia, the language of the Koran, with its copious literature subsequent to that great book. Arabic, with its twenty-eight letters, its 6000 roots, and its 60,000 words, has crowded out the other Semitic tongues, and filled with its words the Persian, Turkish, and Hindustani languages, and largely penetrated into others, as the widely separated Malay and Spanish, for example. At this day it is the speech of all North Africa. But the most important Semitic tongue in English eyes, because a large part of the Bible is written in it, is Hebrew. After the time of the Captivity Hebrew ceased to be spoken. The Jews then spoke and wrote Aramaic, so that it was necessary to read a *Targum* or Aramaic version after reading the Scriptures in the original Hebrew. The Targum of Onkelos translates the Pentateuch, and that of Jonathan the prophets, though their texts were not officially settled till the fourth century of our era. Aramaic was the language of Palmyra, where inscriptions from the first century B.C. exist. It remained in fact the predominant Semitic tongue for over 1000 years, when Arabic took its place. Aramaic is the language of the later portions of the Old Testament (Daniel, Ezra, &c.), of much of the Mishna and the Talmud; and it is the language of the Jews in Palestine in the time of the apostles, all the Hebrew words and references in the New Testament and in the rougher contemporary work of Josephus being in Aramaic. This is a softened, or as one might say, a corrupted form of Hebrew, poorer in grammatical forms and vowels, and altered in consonants, blurring down *s* into *d*, *ts* into *t*, *sh* into *th*, &c. From about the second century onwards the Christian theologians made wide and rapid alterations in Aramaic, till it became practically a new tongue, and in its altered state it is usually called Syriac. Aramaic lasted on in this new form as a spoken language until the tenth century, when it disappeared. Phœnician, unhappily, has totally disappeared, and but fragments of the vast literature of Assyria and Babylon remain.

Between the Aryan and Semitic races, which have played between them the most conspicuous part in the history of the world and of civilization, a profound and well-marked separation can be traced in religion, in politics, in literature, in manners and customs, which has descended, in many points, even to our own days. The Jews still

form a nation distinct from all others; and the Arabs and Turks have still nothing in common with the European in their thoughts, feelings, and beliefs. In politics we owe but little to the Semitic races. Political life has grown and flourished peculiarly among the Indo-Europeans; whereas among the Semitic races there has been no medium between the anarchy and wild liberty of the nomad Arabs and a sanguinary and complete despotism. To constitutional liberty, wisely organized and guarded by many checks against possible abuses, such as the Anglo-Saxons have conceived and perfected, the Semitic races have always been strangers. Theocracy, anarchy, despotism has too often been the cycle of their policy. In the department of poetry, however, we owe them much. We owe to them the matchless psalms of David, which have been, and still remain, a valuable source of poetic inspiration. Yet the drama and the epic seem quite unknown to them. In the realm of art the Semitic races have always been unfruitful. In science and philosophy also they have made but little mark in history. Even the Arabs of the middle ages, among whom the lamp of learning burned brightly while Christian Europe was in darkness, were but the interpreters and commentators of the Greek philosophy. Many valuable inventions are due to the Semitic races. Commerce, for example, was first practised by them on an extensive scale. The Phœnicians were the earliest and the principal merchants of antiquity; in the middle ages the Arabs and the Jews were among the greatest merchants and capitalists; and from a remote antiquity down to the seventeenth century, all European luxury came from the East. But perhaps the most important gift which the now dominant Indo-European nations have received from the Semitic races is that of letters and writing, which were invented by the Phœnicians. The Greek and Latin alphabets, from which all the European alphabets are derived, were but modifications of that invented by the Phœnicians.

But the peculiar and special work, the grand service of the Semitic races to humanity, has been the furnishing it with the purest and most perfect of its many religions. To them we owe Christianity; and, indeed, all the monotheistic creeds, the Jewish and Muhammad as well as the Christian, are of Semitic origin. It is a striking fact that, with the exception of the Brahmans and their followers, almost the whole Indo-European nations—the dominant, the conquering races, in whose power, to a great extent, lies the future destiny of the world—have abandoned their own faiths and adopted the religion derived from the inferior Semitic races. As for the position taken by the Semites in general history, it is not without its grand epochs. The magnificent empire of BABYLONIA has been elsewhere described; and the power of CARTHAGE was

importance remaining is fast ebbing, and only exists by the sufferance of the European nations.

SEMITONE, the smallest interval in modern music of the great nations of Europe, that is, in all such music

music, thus assuming for very many of its modern characteristics of the notes of the true scale. Nevertheless the ordinary ear consents to receive the tempered intervals as representatives of the true ones. The chief semitones are as follows:—

The *Diatonic Semitone*, which occurs between the fifteenth and sixteenth harmonic of any note, and bears the ratio, therefore, of 15 to 16. This is the semitone occurring between the Seventh and the Octave of any scale, or between any two adjacent notes of different names; as between B and C, or between C and D's.

The *Small Semitone* occurs between the minor and major Third and the minor and major Sixth of the scale, and bears the ratio 24 to 25; as between E's and E, and between A's and A, in the key of C.

The *Chromatic Semitone* (or *sharp*) occurs between any two other adjacent notes of the scale of the same name, as between F and F \sharp , C and C \sharp , &c., and bears the ratio of 128 to 125.

Peculiar varieties of the semitone are the Pythagorean intervals, the *Lumma* (ratio 213 : 256) and the *Apotomê* (ratio 2018 : 2187); and the series of partial tones show two others between the thirteenth and fourteenth and sixteenth and seventeenth partials, which would be for the fundamental tone C, roughly speaking, from A to B's and from C to D's respectively.

The exact ratio borne by the equal semitone of the tempered scale is $1:1.059461$, roughly represented by 84 : 89.

SEMI-VOWELS is a name sometimes given by philologists to the vowels *i* and *u*, which, when pronounced with a little exaggeration will drive into consonants; thus the vowel *i* in *pyque* and *u* in *rub*, if rapidly pronounced, and especially when used as starting-points towards a succeeding vowel, easily degenerate into the consonants *j* and *b* respectively. With these are often classed *r* and *l*, which are frequently used in a vowel fashion in English, as in *centre*, *table*, &c.

SEM LIN, a fortified town of the Austrian Empire, situated on the left bank of the Danube, a little above its confluence with the Save, and 3 miles north-west from the fortress of Belgrade. It consists of the inner town and the suburb of Franzenthal, and has 10,000 inhabitants. In the inner town there are some good streets with stone houses. Semlin is the principal emporium of the commerce between Austria and Turkey, importing Turkish goods, such as cotton, skins, &c., and exporting woollen wares, cutlery, glass, and porcelain. It is the residence of John Hunyadi, the deliverer of Christendom in the fifteenth century, from the Turks. It is the residence of a Greek archbishop, and has five Catholic and two Greek churches, and a German theatre.

SEMNOPITHECUS is a genus of monkeys peculiar to the warmer parts of Asia (India, Cochin China, the Malay Peninsula and Archipelago). These monkeys are remarkable for their mouse figure and the length of their limbs, especially the hind pair. There are no cheek pouches, but callosities and a large laryngeal sac are present. The canines are long, and the last molar on each side below has a fifth tubercle. The anterior thumbs are very short. The tail is long. The stomach is sacculated in a very singular manner.

The *Semnopithecus* are arboreal and gregarious; they have been called by some *Slow Monkeys*; but they exhibit great activity and address, preserving, however, in their gambols a sort of gravity and an appearance of apathy, to which circumstance the latter appellation is probably owing. The species are numerous.

The *Simpai* of the Malays (*Semnopithecus malalophos*) is a beautiful species, of a brilliant yellow-red above, whitish beneath, with a tuft of black hair on the forehead in the form of a bandeau; the face is blue. It inhabits the forests of Sumatra.

The *Negro Monkey* (*Semnopithecus naurus*) is remarkable for the uniform black colour of its long silky hair; the young are reddish-brown. They live in troops in the forests of Java, and great numbers are killed for the sake

of their skins. The *Donc* (*Semnopithecus nemæus*), a native of Cochin China, is a remarkable contrast to the preceding species, being adorned with the most vivid and varied colours. The face is naked and orange-coloured, surrounded with long, glossy, white whiskers; the top of the head and the back and sides are gray; the thighs and feet are black, the legs deep chestnut, the forearms, throat, rump, and tail pure white.

The *PRONOSCIS MONKEY* (*Semnopithecus nasalis*) and the *HOON MAN* (*Semnopithecus entellus*) are separately noticed.

SEMOLINA (Fr. *semoule*, literally half-ground) is a sort of coarse wheat-flour, the size of whose particles may be roughly compared to coarse oatmeal. It is made from the hard wheat of Spain and Southern Italy, which to a great extent resists being ground into ordinary flour; and the central portions especially of these dry hard grains are sifted out, broken but not powdered, from the fine flour after grinding. The coarser and more furrowed the mill-stones the greater proportion of semolina to flour occurs.

It is manifest that, made as it is of the finest wheat, semolina is the most nutritious of all the pudding-stuffs—superior to rice, and far superior to corn-flour, &c. In Italy it is made into *polesta*, the staple food of large districts, and in France it is used for *gruau*, a favourite sort of bread. In Algeria it forms the basis of the national dish *consoussou*, into the composition of which fowls and vegetables also enter. The cheap imitation of semolina made from millet and maize has not of course its fine food properties.

SEM PACH, a small town of Switzerland, in the canton of Lucerne, on the east bank of the lake of the same name, and 8 miles north-west of the city of Lucerne, is famous in Swiss history for the victory gained there on the 9th of July, 1386, by a Swiss force of 1100 men, over the Austrian army of 4000 horse and 1400 foot, commanded by the Archduke Leopold. The Swiss historians ascribe their success in this battle to Arnold Von Winkelried, a knight of Unterwalden, who rushed upon the spears of the enemy, grasped as many as he could in his arms, and thus opened a gap in the mail-clad ranks for his compatriots to rush in. It is more probable that the victory was owing to the death of the archduke at the beginning of the action, and to the consequent panic in his army. About 2000 Austrians fell in the battle and pursuit, while the loss of the Swiss was only 200. The anniversary of this victory, and of the heroic death of Von Winkelried, is still celebrated by prayer and thanksgiving on the field of battle. Sempach is surrounded with ruined walls, and has a population of about 1100.

SEMPERVIVUM. See HOUSE-LEEK.

SEMPRONIAN GENS, THE, was one of the most ancient and famous of the clans or *gentes* of Rome. A Sempronius Atratinus, one of the only patrician family in the gens, was consul in the twelfth year of the republic. The most famous family of the gens was that of GRACCHUS (plebeian). The important agrarian legislation of Tiberius S. Gracchus is, however, always spoken of (and quite accurately) as the Sempronian law.

SEN, the small unit of value in the new Japanese decimal coinage of 1871. One hundred sen make a yen. The sen is a copper coin of 7.13 grammes, and is nearly equal to an English halfpenny.

SEN, KESHUB CHUNDER or **CHANDRA**, a celebrated Hindu religious reformer, was born in 1838. He received an Anglo-Indian education at Calcutta, and in 1859 identified himself with the new theistic church founded in 1830 by Rajah Ram Mohun Roy. Many old Brahmanical customs and observances had been retained in the church; and as Keshub Chunder Sen was unable to get them removed, he founded a new society—the Brahmo Somaj of India [see BRAHMO SOMAJ], and he and his

followers adopted a system of spiritual theism resembling all important points that advocated by Theodore Parker, F. W. Newman, and Miss Cobbe, in England and America. All idolatrous ceremonies and customs were rejected in social and domestic life, including the distinction of caste. They also encouraged female education, opposed child marriages, and associated the sexes in a common faith and worship. In 1870 Keshub Chunder Sen visited England, and, by the eloquence and fervour of his addresses, succeeded in awakening a strong interest in the work and development of the Brahmo Somaj on the part of many religious leaders. After his return to India some new features were introduced into the practices of the Brahmo Somaj, which led to dissension and division among its members. Under the guidance of Keshub Chunder Sen the simple theism of the society gave way to certain mystical doctrines, for which special divine inspiration was claimed, and ritual of the most elaborate description was introduced into the devotional services. He also allowed his daughter to be married at the early age of fourteen—in contravention of one of the most beneficial regulations he had formerly striven to enforce. Those who knew him best were, however, convinced that his intentions were always good, and in the opinion of Professor Max Müller—"If we look around for true greatness, not only in England or Europe, but in the whole civilized world, and if we try to measure such greatness, not by mere success or popularity, but honestly and, so to say, historically, taking into account the character of the work done and the spirit in which it was done, few, I believe, would deny that it was given to Keshub Chunder Sen to perform one of the greatest works in our generation, and that he performed it nobly and well." Keshub Chunder Sen died on 9th January, 1881, in the forty-sixth year of his age.

SENA'NUS, SAINT, is the hero of a monkish legend frequently referred to. He lived on the remote island of Scattery, having resolved from circumstances in his past life that no woman should approach him. An angel brought St. Canaan thither to try him, but he obstinately refused to allow her to land. One of Moore's Irish melodies is written upon this subject.

SENATE, THE ROMAN (Lat. *Senatus*, an assembly of elders, *senes*). As long as Rome comprehended one tribe, the Latins of the city on the Palatine, the Senate consisted of only 100 members. After the accession of a second tribe, the number of senators was raised to 200; and when a third tribe was united with them the number of senators was increased to 300.

The function of the Roman Senate under the kingly government was that of a body of advisers to the king, precisely corresponding to the family council which assisted and regulated the despotic power of the head of a household. The king convened it when he chose, and invited whom he would to fill up any vacancy, choosing, of course, a man of the same tribe; but once chosen the office was held for life. It was entirely a consultative, not a ruling body; it did not legislate, but it guarded the law even against the king.

But on the establishment of the republic the powers of the Senate grew. It was, indeed, at first apparently unchanged, chosen and summoned by consuls instead of kings; but in reality its whole fate was changed by a practice which quickly grew up of largely filling vacancies by nominations of the principal plebeians of the equestrian order. The new senators were called *Conscripti*, or "enrolled," in opposition to the *burgesses* or *Patres* ("fathers"); and the whole Senate was styled *Patres Conscripti*, which is short for *Patres et Conscripti* (*burgesses* and enrolled).

Senators increased the number of the Senate to 500 or 600; and Cæsar raised it to 900, but Augustus reduced the number again to 600. What the number continued to be under the empire is uncertain.

During the latter part of the republic the age of admission into the Senate was probably twenty-six, for a man might be elected quaestor at the age of twenty-five, and a quaestor was admissible into the Senate after the expiration of his year of office. This explains why the patricians opposed the eligibility of the plebeians to the quaestorship. After the establishment of the censorship the election of persons into the Senate was in the hands of the censors. All curule magistrates—that is, consuls, prætors, curule ædiles, quaestors, and censors—had by virtue of their office a seat in the senate, and might speak. After their office was over they retained this right, but without being real senators. New vacancies in the Senate were filled up at every census, that is, at every fourth year, as a rule, and later at every fifth year, and it was only on this occasion that the censors might elect those ex magistrates into the Senate whose conduct was unblemished. Hence we have to distinguish between two kinds of senators—real senators (*senatores*), and such as were allowed "discretion in senate." After the establishment of the censorship, the honour of princeps senatus, or "first man of the Senate," was conferred by the censors, and at first upon the eldest of the living ex-censors, but afterwards upon the person whom they thought the most worthy. (This title of princeps, *prince*, was the official title acknowledged by the early emperors.) The plebeians obtained access to the Senate through the various magistracies as they were successively opened to them. At last even the tribunes became, by the possession of the office, full members of the Senate. Thus the Senate was ultimately filled by the election of the people, for the people chose the magistrates, who by virtue of their office gained access to the Senate.

Though the senators were probably among the wealthiest people of Rome, there is no evidence that any property qualification was required before the time of Augustus. If a senator's property was diminished below a fixed amount, he was obliged to withdraw from the Senate, unless the emperor took no notice of it or supplied the deficiency. Augustus fixed the senatorial age at twenty-five.

Under the republic the Senate of Rome partook more or less of the character of a body representing the people; it was, as Dionysius says, the head and soul of the whole republic, or the concentrated intelligence and wisdom of the whole nation. It is chiefly to the consistency, wisdom, and energy with which the Senate acted during a long period that Rome was indebted for her greatness and her success. Its acquisition of the supreme power was gradual and necessary. A body of members of high position and influence, sitting for life, quickly obtained supremacy over the consuls who in the republic represented the old kingly office, for the consuls held office only for a year, whereas the Senate was a permanent institution.

The power which it exercised during the republic may be comprised under the following heads:—

1. It had the control of the public treasury (*aerarium*) by means of its quaestors. The accounts of all the revenues were laid before the Senate, and no part of the public money could be expended without its consent.

2. Crimes committed in Italy, such as treason, conspiracies, poisoning, and murder, belonged to the cognizance of the Senate; moreover, if any private individuals or any of the allied towns of Italy had disputes among themselves, if they had done anything deserving punishment, or if they required assistance or a garrison, all this was within the power of the Senate.

3. All ambassadors sent from Rome, and all commissioners charged with the regulation of the affairs of a newly-conquered province, were nominated by the Senate, and the ambassadors themselves were in many cases members of that body. All foreign ambassadors communicated with the Roman senate. Treaties concluded with foreign

nations by a Roman general required its sanction. All colonies were founded and national lands assigned by the Senate.

4. It assigned to the consuls and prætors their respective provinces, and might at the end of a year decree the prolongation of their power, as "proconsul" and "proprætor," and it alone could confer on a victorious general the honour of a triumph.

5. In times of great danger it could delegate unlimited power to the consuls; and this was done by the formula, *Videant consules ne quid res publica detrimenti capiat*: "Let the consuls see that the commonwealth sustains no damage." It had also the supreme superintendence in all matters of religion.

In fact, the various powers of the Senate, taken together, constitute perhaps the finest example of aristocratic rule that the world has ever seen; and had not this system been overthrown—first by the attempts of the patricians to keep out the plebeian aristocracy, or at least to prevent them from debating, which, though they failed, yet sowed the seeds of ruin, and secondly, by the too-successful attempt of the Roman Senate to keep out all provincial representatives, thus giving the chance for unscrupulous bribery to sway the great city of Rome, and destroying the only possible check against the assumption of monarchical power—the Senate might have had even a longer and more glorious career than it had. Caesar saw this when he raised the Senate to 900 members, which he did purposely to admit all classes of persons, even non-Italians, Gauls, Spaniards, &c. But the fact that he did so by arbitrary power convicted what would have been a safeguard into the means of destruction, and its very size made it only a more unwieldy tool for the monarch to wield.

But the only real Senate lost its former character, for the emperor became the sovereign; the Senate was a subordinate power, the registrar of the will of the emperor, and a high court of justice. The history of the Roman Senate is a very large and instructive subject.

SENATOR OF ROME, THE, was the title for many centuries of the chief magistrate of Rome in mediæval and modern times. It was even governor and representative of the Pope in some of his dealings, answering very closely to the *poderista* of the Italian republics. The popes continued the policy of the Caesars in many ways, and frequently affected to adopt or permit liberal and republican forms, while all real power remained of course in their own hands. In the dioceses we find sometimes a senate, sometimes a patrician, sometimes a consul wielding the civil power. At last the old Roman names were summed up in the single Senator, who was first chosen in 1192 in a fit of desperation at the unconquerable anarchy of the great nobles of Rome, against which for half a century an elected senate of fifty-six members had vainly striven. The new lord of Rome

to be annually elected, to be a doctor of laws, an alien, residing at a place at least 40 miles distant from Rome, and not connected, within the third degree of consanguinity, by blood or marriage with any Roman citizen. Nicholas III. having suffered from the ambition of Charles of Anjou when senator added a stipulation in 1280 that the senator should not be an emperor, king, prince, marquis, duke, or baron, nor the brother, son, or grandson of such. The senator had three assistants for judicial purposes, and three for financial purposes (the conservators), thirteen chiefs of militia over as many districts, and a council of 129 persons. A general assembly of all male citizens also existed, and was called upon under all serious circumstances. This constitution, with many interruptions, but few important changes, endured for over six and a half centuries, and may be said to have come to an end only in 1848.

The senator was an annual officer, and elected by the citizens in theory; in practice, especially in early times, he served for many years (Charles of Anjou was appointed for

ten years, for instance), and was always the creation of the Pope. By the laws his conduct had to be scrutinized officially at the end of his year, and he could not serve again until after two years. These conditions were rather more strictly observed after 1580, when Gregory XIII. collected and tabulated the Roman laws—constitutional, criminal, and civil—and this code lasted till our own day. Down to 1848 the foreign senator and the three conservators (who were changed every three months) resided in the palace of the Capitol. In the twelfth and thirteenth centuries the senator even acquired the privilege of coining money, and several such coins exist in our collections. At this time the senatorial authority was so great that Innocent III. exacted an oath of fealty from the senators of his day. It will be remembered that Rienzi's second rule at Rome was under the title of senator, and was practically unlimited in power.

SENEBIE RA is a genus of plants belonging to the order CRUCIFERÆ. The Common Wart Cress or Swine's Cress (*Senecio coronopus*) was formerly gathered and eaten as a salad, but has since been properly neglected, as it is acrid and unpleasant, and requires much boiling to render it eatable. It is a native of Europe, North America, and England. The Lesser Wart Cress (*Senecio didyma*) is found on waste ground near the sea in the south and south-west of England; it has a very pungent smell. Both these species are insignificant weeds with much branched prostrate stems, finely-divided leaves, and small white flowers.

SENECA, LUCIUS ANNÆUS, the son of Marcus Seneca, the rhetorician, was born at Corduba a few years before the Christian era, and brought to Rome by his parents when a child. His education was rhetorical, after the fashion of the times, and he also studied philosophy. Having enlarged his mind by travel in Greece and Egypt, he commenced pleading at the Roman bar. He afterwards filled the office of quæstor, and had commenced a career of great prosperity, when having been accused of an adulterous connection with Julia, the wife of Vinicius, he was banished to Corsica by her uncle the Emperor Claudius (A.D. 41). In his exile he wrote his "Consolatio ad Helviam," a consolatory letter addressed to his mother. After eight years' exile he was recalled (A.D. 49), through the influence of the emperor's second wife, Agrippina, and was made the tutor of Nero, the son of Agrippina by a former husband. Seneca was unfortunate in his pupil, whose bad disposition he did not or could not correct.

Agrippina poisoned Claudius A.D. 54, and secured the succession to her son, the Emperor Nero, whose funeral speech over the man whom his mother had murdered was the composition of Seneca. The philosopher was constantly in attendance upon the emperor, and Tacitus affirms that he honestly endeavoured to check his wild career; but it tells against Seneca that he grew exceedingly rich during his connection with Agrippina and her son. In the murder of Agrippina, which was accomplished by the order of her own son, A.D. 60, Seneca was not entirely innocent. It was almost impossible that Nero could maintain his power if his ambitious and insolent mother lived; and Seneca, to say the least, consented to her death. But his greatest crime was being the author of a letter which Nero sent to the Senate, in which the emperor charged his mother with conspiring against him, and with committing suicide.

Seneca's wealth soon excited the emperor's envy, for his extravagance had reduced him to want money. In an interview with the emperor Seneca offered to give up all that he had, but Nero accepted nothing, and dismissed him with hypocritical assurances of his regard. After this he saw very little of Nero, and in A.D. 65, on the charge of being involved in a conspiracy against the emperor, was sentenced to put himself to death. The mode which he

chose was by opening his veins; but he was old and his body was attenuated, and his blood would not flow easily. His wife Paulina insisted on dying with him, and her veins also were opened. Seneca's sufferings were so great that to save his wife the pain of seeing him, he ordered her to be carried to her chamber, where the soldiers who were sent to see Seneca die bound up her wounds at the entreaty of the slaves and the freedmen, and she lived a few years longer. The philosopher attempted to terminate his sufferings by poison, but it had no effect, and he then entered a warm bath, and was finally carried to a vapour stove, where he was quickly suffocated. He died with the courage of a Stoic, for that was the philosophy which he professed; but there was also a theatrical display about his last moments, as if he were acting a part which he wished not to be forgotten. It is difficult to determine the character of a man who was so long about Nero, and yet wrote so eloquently on morality and philosophy. If his conduct was not pure, and it certainly was not in the matter of Agrippina's death, his judgment and his feelings were on the side of virtue. But it was impossible that he should be intimately connected with such a man as Nero without sharing some of his infamy. At the same time we must remember the extraordinary temptations of the times. Whatever opinion we form of Seneca's moral character or political conduct, we must admit his great abilities and his powers as a writer.

His works, which are nearly all on moral and philosophical subjects, are numerous. Lipsius calls the "Book on Providence" a golden book. It was the doctrine of Seneca that God is always present with us. His seven books "On Benefits, or giving and receiving Favours," contain some excellent matter, though it is not arranged with much order. His "Epistolæ," which are 124, do not relate to the ordinary affairs of the day, but are on moral topics, and full of maxims and general remarks. The seven books of "Quæstiones Naturales" are a collection of natural phenomena from the works of Greek and Roman writers, with a few moral remarks interspersed.

Ten extant tragedies, in iambic senarii, with choruses interspersed, are attributed to him. They are not adapted to the stage, and indeed were not intended for it. They contain many striking passages, and have some merit as poem.

There are editions of Seneca by J. F. Gronovius (Leyden, 1649); by Ruhkopf (Leipzig); and there is the Bipont (Strasbourg, 1809), five vols. 8vo. An English translation of the works of Seneca by "Thos. Lodge, D. in Physicke," was published in 1614. "It contains all the prose works of Seneca, except the "Apocolocyntosis," or satire on Claudius (literally his "pumpkinification," in lieu of the dedication usually accorded to emperors), a piece of spite as far-fetched as his disgustingly fulsome flatteries of Nero in other works.

SENECIO (from Lat. *senex*, on account of its silvery capitate seed-down, resembling the gray hairs of an old man) is a genus of plants belonging to the order *COMPOSITÆ*, suborder *Corymbifera*. The species are annual, perennial, shrubby, or half-shrubby plants. The flower-heads are generally yellow, with the florets either all tubular or more usually the central tubular and the marginal strap-shaped. The involucre is cylindrical, with usually small scales at its base. The species of this genus are very numerous, and spread all over the world, but are not remarkable for either beauty or utility. Common Groundsel (*Senecio vulgaris*) is one of the most common of weeds. Ten other species occur in Britain—Wild Groundsel (*Senecio sylvaticus*), Clammy Groundsel (*Senecio viscosus*), Elegant Groundsel (*Senecio aqualidus*), Hoary Ragwort (*Senecio crucifolius*), Common Ragwort or Ragweed (*Senecio Jacobaea*), Water Ragwort (*Senecio aquaticus*), Marsh Ragweed (*Senecio paludosus*), Broad-

leaved Ragwort (*Senecio saracenicus*), Marsh Flea-bane (*Senecio palustris*), and Field Senecio (*Senecio campestris*).

The Common Groundsel (*Senecio vulgaris*) is an erect branching annual from 6 inches to a foot high, with pinatifid leaves and small yellow flower-heads in close terminal corymbs; the florets are usually all tubular. It flowers all the year round. It is a very common weed in Britain, Europe, and Northern Asia. Cage-birds are fed on the young buds and leaves. The Ragweed or Ragwort (*Senecio Jacobaea*) is also very common on waste places and pastures in Britain and Europe. It is a perennial, and a larger coarser plant than the groundsel, with large, bright yellow, rayed flower-heads.

To this genus belongs the well-known *Senecio cineraria*, from the shores of the Mediterranean, whose beautiful foliage, glistening with a short silvery down, causes it to be extensively employed in gardens as a contrast to scrub and bold bright colours. The generic name *Cineraria* is limited to a few Cape plants, differing from *Senecio* in the winged achenes of their ray-florets. The *Cinerarias* of our English greenhouses, which flower early in spring, and are covered with a multitude of blossoms, belong to the genus *Senecio*, and have been obtained by intercrossing several Canary Island species.

SENEFFE, a village of Belgium, in the province of Hainault, 11 miles north-west of Charleroi, near which Condé fought his last great battle, defeating William of Orange in 1671.

SENEGA or SNAKE ROOT. See POLYGATA.

SENEGAL is the name of a large river in Western Africa, which enters the Atlantic by two embos between 15° 50' and 16° 30' N. lat. It

river of Senegambia, and drains nearly half the surface of that country. The most important of the streams which unite to form the Senegal are the Ba Woolina and the Ba Fing. The latter rises in 10° 30' N. lat., 10° 15' W. lon., and flows about 400 miles before it joins the Ba Woolina, which river rises in 13° N. lat., 6° 40' W. lon. and flows about 350 miles before the junction. The Senegal formed by the junction of these two rivers, near 11° 10' N. lat., 10° 30' W. lon., flows out of the mountainous country into the plains. At one point it divides into two large arms, which reunite after having been separated for a distance exceeding 100 miles. The river then runs chiefly channelled for more than 60 miles, but on approaching the sea it again divides, near Faf, into two arms. The principal one continues westward to the sea; the other, which is called Saguerai, pursues south, and then west, and rejoins the main river almost opposite the city of San Louis, after traversing nearly 50 miles. Having approached the sea within 6 miles the river again divides into two, and enters the Atlantic by separate mouths.

The ascent is only practicable in the wet season, and even then the voyage is slow and tedious, partly on account of the rapidity of the current, and partly because of the numerous windings. There is a bar at its mouth, which in the dry season is only covered with from 8 to 9 feet of water. After the rainy season in July and August the water rises and overflows, fertilizing the adjoining country. The entire length of the Senegal is estimated at 1000 miles. The tides are perceptible in it for 60 leagues inland.

SENEGAL, a French colony of SENEGAMBIA, in Africa, consisting of the territory which lies along the Senegal River, as far as its tributary, the Faleme, and south of the river (Cayor) along the coast, with indefinite interior limits, as far as the promontory of Cape Verd; besides isolated possessions southward on the banks of the Cazamance River (the chief station, Cambel), on the Rio Nuñez and Rio Pongol, and on the Malleory or Mellacoree River, North Senegal. St. Louis, at the mouth of the Senegal, is the seat of government, but the

chief commercial town is that of Dakar, on the peninsula of Cape Verd, protected by the fortress of Goree, on a basalt island at the entrance to the harbour. The negro inhabitants are mainly Wolofs or Jolofs and Mandingoes. The soil along the rivers is in many parts exceedingly fertile, but between the Senegal and Gambia, in the interior, there is a wide extent of wasteless country with barren surface. The climate is generally unhealthy for Europeans. The rainy season lasts from the first half of June till the end of November. The trade is in palm oil, gums, wax, ivory, pepper, cotton, hides, ebony, &c. The population of French Senegal and its dependencies in 1886 was over 220,000.

SENEGAMBIA is a term adopted by geographers to indicate a part of the western coast of Northern Africa, but it has not always been applied to the same extent of country. Originally it was only used to indicate the regions which lie between the Senegal and the Gambia, from which names the term has been composed.

This part of the African coast was visited by Hanno, the Carthaginian admiral. It was again discovered by the Portuguese between 1444 and 1469, and they formed several commercial establishments near the mouths of the principal rivers. These places, however, were neglected after the route to the East Indies had been discovered by Vasco da Gama (1497). The French and the English next tried to get a footing here; the former first settled on the Senegal about 1637, and the latter acquired the Gambia in 1686. Since that time the discoveries in this part of Africa have been numerous. Modern geographers place the limits of Senegambia between 8° and 18° N. lat., 4° and 17° 30' W. lon. The area is about 300,000 square miles, and the population is estimated at 12,000,000.

The country along the lower Senegal is fertile, though undulating and thinly inhabited. Between the mouth of the Senegal and Cape Verd, the country is generally a sterile sandy desert. The district contiguous to the shores of the Atlantic, between Cape Verd and the mouth of the river Gambia is much more varied and fertile. There are several small harbours on this coast, Red Cape, Portudal, Saine, Fatik, and the mouth of the river Joombas. The land situated immediately on the banks of the Gambia, as far as Pisania (a small British settlement 200 miles from its mouth), consists of a level alluvial tract extending about 2 miles from the river. It is subject to annual inundations during the rains. At the back of the low coast-line between Cape Verd and Guine lies a more elevated country. The country south of the Gambia is drained by the Rio Grande and the Nuñez, which are about 400 and 200 miles long respectively, and are both navigated to a considerable distance from their mouths. The whole of the area between them is supposed to be a collection of islands, divided by the affluent branches of the two rivers, many of which remain unexplored. The banks of both streams are densely wooded, and the country watered by the Gambia is very populous. It produces gold, ivory, wax, hides, and horses, and is studded with immense ant-hills.

Senegambia has long been noted for the great degree of heat to which it is subject all the year round. In all the parts remote from the coast the hottest part of the year is during the last months of the dry season and at the beginning of the rains, but on the shore the latter immediately depress the temperature several degrees. The climate often proves fatal to Europeans, especially during the wet season, when they are seized with dysentery, liver complaints, and various kinds of fevers. Tropical produce, in rice and maize, fruits, gums, forest trees, &c., is very abundant. There are huge forests of acacia trees in the north, from whence the gums are chiefly obtained. Iron occurs in vast quantities, but it is little worked. Gold is also obtained in a few places, especially in BAMBOUK.

The inhabitants of Senegambia belong properly to the negro race. But it appears that from a very remote period

the Moors and Arabs have mixed with the most populous tribes of the negroes. These are known under the names of Foulahs or Foolahs, Jalofs or Jaloofs, Mandingoes, and Serriawollies; and they occupy the more elevated part of Senegambia, leaving to the other minor tribes only the low country which extends along the sea from the mouth of the Gambia to Cape Verd. The three European nations which established commercial intercourse with this country took possession, as it were, of the three large rivers, the French of the **SENEGAL**, the English of the Gambia, and the Portuguese of the Rio Grande. The British settlements collectively are called **GAMBIA**. The capital is **BATHURST**, on St. Mary's Island, one of the healthiest places in Western Africa for Europeans, and **SIERRA LEONE** forms part of this colony. In 1876 a proposal was officially made to cede the British possessions to France, but in consequence of the strong expressions of feeling against it, the idea was ultimately abandoned. The Portuguese establishments are at Bissao, Jeba, Bolula, Cacheo, &c.

Nearly all the articles of commerce which are exported from Senegambia are brought from the interior by small caravans or carilas, which generally stop at the places where commercial establishments have been founded, and take European merchandise, principally cotton and iron manufactures, arms, and tobacco, in exchange for their goods. A considerable commerce is also carried on between this region and the countries further east.

SEN'ESCHAL (Teut. *senes-schale*) was probably, at first, an attendant who superintended the household of the Frankish kings, but the office afterwards rose into importance, and was held by distinguished military commanders. In England and Scotland the equivalent office was steward, grand steward, or lord steward.

SENESINO (that is, the "Sienese") was the popular name of Francesco Bernardi, one of the most celebrated soprano male singers of the last century. Handel heard him at Dresden in 1719, when he was nearly forty, and brought him at once to England as an acquisition of the first merit. Senesino from the first thoroughly gained the applause of his English audience, and when, after singing many years the principal parts in Handel's operas, he quarrelled, in 1733, with that great and eminently inextinguishable man, the public to a great extent took Senesino's part, and engaged him and other artists in a rival company to that of Handel, with Porpora as the conductor. Senesino returned to his native Siena in 1735, and was believed to carry with him a fortune of £15,000. He died in 1750, aged seventy. The quality of his voice was rather that of mezzo-soprano than soprano, and was very full and pure—his style was simple. By many he was preferred even to Fannelli.

SE'NIOR, NASSAU WILLIAM, a writer on political economy, and a man of letters of distinguished reputation, was the eldest son of the Rev. J. R. Senior, M.A., vicar of Bournemouth, Wiltshire. He was born at Uffington, in Berkshire, 26th September, 1790. He received his education at Eton, whence he was removed to Magdalen College, Oxford. Here he distinguished himself by his powers of application and intellectual acumen. He graduated in 1811, taking an unusually meritorious first-class in mathematics. In 1819 he was called to the bar at Lincoln's Inn. In 1826 he was appointed professor of political economy at Oxford, which he held for the statutory term of five years, and to which, in 1847, he was again elected for a similar term. In 1832 he acted as one of the commissioners appointed by government to inquire into the evils of the English poor-law administration, and his able report may be regarded as the foundation of the more equitable system afterwards inaugurated. In 1836 he was rewarded with the post of a master in Chancery. At a later period he was nominated one of the commissioners of national education under the presidency of the Duke of

Newcastle. He died 4th June, 1864. His principal works are—"Lectures on Political Economy" (revised edition, 1852), which was translated into French by Arivabène; an "Outline of Political Economy," originally contributed to the "Encyclopædia Metropolitana;" "Report of Commission of Inquiry on the Poor Laws" (1832); and "Essays on Fiction," republished from the *Edinburgh and Quarterly Reviews* in 1864, remarkable for their acute analysis and felicitous criticism. The authors whom he treats most successfully are Scott, Bulwer Lytton, and Thackeray. In 1863 he published a volume of "Biographical Sketches," likewise reprints from reviews. Two other works, "Conversations with Distinguished Persons during the Second Empire," and "Conversations with Thiers, Guizot," &c., were published after his death.

SENIOR OPTIME is a Cambridge expression relative to the mathematical tripos. Honours men are divided into Wranglers, Senior Optimes, and Junior Optimes. The term is therefore equivalent to second class in honours.

SEN'LAC, the place where the so-called battle of Hastings was fought in 1066, now called **BATTLE**. For an account of the battle of Senlac see **WILLIAM THE CONQUEROR**.

SEN'NA is a valuable drug consisting of the dried leaves of species of **CASSIA**, a genus of the order Leguminosæ. The species which furnish senna are bushy shrubs, 2 to 4 feet high, with unequally pinnate leaves, the leaflets of which are unequal at the base and in four to eight pairs; the yellow flowers are in erect axillary racemes, and the broad flattened pods contain six or more seeds. They are natives of Northern Africa, India, &c.

Alexandrian Senna consists of the lance-shaped leaves of *Cassia acutifolia*, with which the obovate leaves of *Cassia obovata* are occasionally mixed. It is chiefly cultivated in Nubia and Upper Egypt, and largely exported from Alexandria. Bombay, East Indian, Arabian or Mecca Senna is produced by the longer narrower leaves of *Cassia angustifolia*, a native of Arabia, Sind, and the Punjab. The leaves are gathered chiefly in September after the rainy season; the shrubs are cut down and exposed to the sun until the leaflets are quite dry and drop off. Tinned Senna is produced also by *Cassia angustifolia*, which is cultivated with great care in the south of India, the leaves being large and of a fine green colour. Other species of Cassia also furnish the official senna. The leaves of a North American species, *Cassia Marylandica*, possess similar but less active properties.

Senna is often, though less frequently than formerly, adulterated with the leaves of *Solenostemma argel*, *Tephrosia apollinea*, and *Coriaria myrtifolia*. When free from adulteration senna furnishes a most valuable purgative medicine; but when impure its action is accompanied with nausea, griping, and other unpleasant symptoms. It is desirable therefore to free it from impurities before administering it, or subjecting it to the action of water to form an infusion. If the infusion be made with cold water, it never gripes: this method is now much employed to form the concentrated infusions supplied by wholesale chemists and druggists to country practitioners. It requires that the water should stand twenty-four hours on the leaves, which should be kept down with a heavy weight, and the air excluded as thoroughly as possible. It is also sometimes used in the form of a tincture and confection. It contains two bitter principles and a cathartic acid, upon which its activity mainly depends. Bladder-senna, the leaves of which possess similar purgative properties, is an allied genus, **COLUTEA**.

SEN'NA or **SENA** is the name of a province belonging to Portugal, on the east coast of Africa, opposite Madagascar. The town of Senna—which stands in a plain, on the right bank of the Zambesi, 110 miles west of Quillimane—was formerly the capital of all the Portuguese do-

minions in this part of the world; but is now a ruinous collection of huts and a few European houses. It is, however, still the chief place in the province, and exports the teeth of the hippopotamus, elephants' tusks, rhinoceros' horns, tiger skins, honey, wax, and gold dust. The imports consist of various European goods.

The Portuguese took possession of this coast about the middle of the sixteenth century.

SENNAAR, a negro state in the south of Nubia, on the banks of the Nile, and at the junction of its two great branches, the Bahr-el-Azrek (Blue River) and the Bahr-el-Abiad (White River). It was formerly an independent state, and one of the most powerful in that part of Africa; but it constituted a part of the Egyptian province of SOUDAN until the events that led to the abandonment of the latter in 1885.

The junction of the two great arms of the Nile is in lat. 15° 37' N. The tract between these two rivers, increasing south to a width of two or three days' journey (50 or 60 miles), is called by the Arabs the island of Sennaar; the name given to it by the indigenous population is Hooce (Hû). The towns or villages lie chiefly along the banks of the Blue River or Bahr-el-Azrek, and are tolerably numerous from the 13th parallel downwards for a distance of 200 miles. From that limit, or perhaps in some places a little further south, the country is all nominally included in Sennaar.

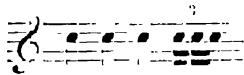
The territory of Sennaar is collectively a great level plain, from which masses of rock protrude at wide intervals, but to no great elevation. West of the town of Sennaar, however, are the Mountains of Moia, the highest 1200 feet, Mander and Segadi, apparently extending as a chain from south to north, but in reality disconnected. The ebony-tree grows round Jebel-Moia; the scyamore fig round Segadi. The plain of Sennaar, for some distance above Khartoum, exhibits only a sandy soil, apparently mixed with deposits from the river. But from Messelimah upwards its character becomes exceedingly fertile. Immediately before, and at times during the rains, the heat is insupportable; the thermometer in a tent rising to 119° Fahr., while the humid air resembles a steam-bath. Then come the deadly fevers and dysentery, which are most fatal on the argillaceous plain. In winter the thermometer often falls to 60°, and the atmosphere is so free from humidity that meat will dry without decomposing. The cultivation of the sugar-cane is confined to a few places. The kitchen-gardens produce onions, red pepper, balmych (a mucilaginous vegetable), chick-pease, kidney-beans, cucumbers, and some plants which are not found in Europe; cotton and tobacco are cultivated as objects of commerce, and near the town of Sennaar lemons are grown. There are many fruit and timber trees. Horses are more numerous than in the countries further north on the Nile; but the chief wealth of the nomadic tribes which inhabit the uncultivated districts consists in their camels, cattle, sheep, and goats. The wild animals are very numerous, comprising the elephant, rhinoceros, gnu, lion, hippopotamus, hyena, crocodile, ostrich, eagle, and vulture. The country contains gold and iron. Some coarse salt is obtained, but the best kind is imported.

The population of Sennaar, though certainly of Arabic origin, is now of a very mixed character. The better classes have generally handsome features and well-proportioned figures. Their dark-brown complexion and rather thick lips alone betray some distant consanguinity with the negroes. The *ferda* or toga, generally worn, admits of being gracefully fitted in a variety of ways. The elaborately frizzled hair and the elegantly made sandals of the people exactly represent the fashion of ancient Egypt as painted on the tombs. The houses are built of dried bricks and roofed with *halfa* (a grass), durra straw, or reeds. The most populous town is KHARTOUM, situated at the

confluence of the two great branches of the Nile. The former capital was Sennaar, which was destroyed when the Egyptians occupied the country in 1822, but has since been partly rebuilt.

The ancient history of Sennaar is very little known. The popular traditions represent the country as the original seat of the Macrobii, whom Herodotus mentions as the most remote of the Ethiopians, and as a people whose gold provoked the cupidity of Cambyses. As Christianity spread up the Nile, it was soon received by the descendants of the Egyptians, and in the tenth century the most flourishing state in Ethiopia was the Christian kingdom of Alwa, on the Blue Nile, with Soba for its capital. The ruins of Soba may now be recognized on both sides of the river, about 15 miles above Khartoum. Afterwards the country formed a part of the Empire of Abyssinia, and at a later period of Nubia. About the fourteenth century it was wrested from Nubia by a family which came originally from Iysaam, a country in Soudan. In 1822 the country was conquered by Egypt.

SEN NET (or *Symmet*, or *Cyquet*, &c.), a trumpet flourish, most probably a sevenfold repetition of one note, as in the illustration beneath. The term is of frequent use in Shakspeare and the other Elizabethan dramatists.



SENS, a city in the French department of Yonne, is very pleasantly situated on the right bank of the Yonne, at a distance of 70 miles by railway south-east from Paris, and has civil and commercial tribunals, a lyceum, and 13,515 inhabitants. The city occupies the site of the ancient *Apothecium*, the chief town of the *Senones*, whose name it afterwards took. The remains of ancient roads and Roman camps abound in the neighbourhood. From the end of the first century it gave title to a bishop, and afterward to an archbishop: the arch-diocese is now united to that of Auxerre. The town is of an oval form, surrounded by Roman walls now partly destroyed, and entered by nine gates, three of which belong to the middle ages; the rest are modern. The streets are mostly narrow and crooked, and the houses ill built. There are two bridges over the Yonne, which is joined by the Vannes on the south side of the town. The principal public buildings are the cathedral, a large Gothic structure remarkable for its vast nave and lofty tower; and the communal college, which comprises a museum of antiquities and a public library. The cathedral contains the splendid marble monument of the dauphin (son of Louis XV., and father of Louis XVI., Louis XVIII., and Charles X.)—a *chef d'œuvre* of Consten. In the chapter-house is a painting of the death of Thomas A'Becket, who took refuge in Sens in 1166. There are public baths, a theatre, an hospital, a seminary for the priesthood, and many curious houses of very ancient date. The chief manufactures are—sage, druggist, wax candles, glue, Spanish white, steel ware, nails, dials, razors, crucibles, phosphorus, woollen yarn, beer, leather, &c. There are also iron and copper foundries. The chief trade is in corn and flour for the supply of Paris, wine, wool, linp. tiles, bricks, bark, leather, hides, timber, oak staves, &c.

SENSA'TION. A sensation is an ultimate mental fact, an element of mind. Mind is built up of sensations and of nothing else, and if we could enlarge our sensations we could enlarge the range of our minds. Probably the many puzzling facts as to the extraordinary power of sensibility often manifested by the lower animals (as the sight of the vulture, the smell of the dog, &c.) are due to the fact of these animals being possessed of some class of sensations unknown to ourselves. It is quite common for us to find ourselves warned against or attracted towards some

person of whom we know absolutely nothing; and we are totally unable to give a warrant for our feeling. Such sensations may be due to some subtle emanation or manifestation of that vital force which we feel, though we cannot as yet recognize it, and which forms the true basis of the perplexing facts of spiritualism, mesmerism, &c. If this conjecture be true we have here a new class of sensations, and one which would enlarge our knowledge and the range of our mind to an enormous extent. At all events it will serve to show how easy it is to imagine the possibility of sensations quite distinct in kind from those which are so familiar to us in our daily life.

In the term *Sense*, as used in ordinary language, we include not only the sensory apparatus, but all the sensations produced by it; the sense of sight would be held to cover all light-sensations, for example.

A sensation, strictly defined, is that mental fact which concurs with a physical fact, it is the mental result of a stimulus acting upon one of the sensory organs. A flash of light awakes the sense of sight: certain physical changes take place in the sight-organ, the eye, and a train of change passes along the sensory nerve to the brain, which receives the impulse in a special ganglion, and at once is affected with the sensation of sight. It is the brain-ganglion which sees, not the eye. Cut the optic nerve, and the eye, however perfect, sees not. Many deaf persons exist who have the most perfect ears possible, but the nerve being defective they cannot hear. Such as are deaf only by defects of the outer ear, on the other hand, can be made to hear by the *AUDIPHONE* through the teeth, and this is true hearing: a very complete and perfect proof that it is the brain and not the outer ear which hears. As yet no similar instrument exists to enable the blind to see.

Unfortunately it proves upon trial impossible to isolate a sensation. Directly a sensation is localized or referred to an external object, directly it causes recognition of something external to ourselves, it becomes a perception, a mental act. Possibly a baby, before he has acquired the habit of discriminating his sensations and localizing them, may experience pure sensation; but adults never do. In a perfect or imperfect form perception, not sensation, is the ultimate fact of mind we reach. The baby experiences warmth, light, noise, &c., and evinces satisfaction or the reverse, but for a considerable time does not attempt to turn towards the source of pleasure or turn away from the source of pain, and this may possibly be a case of unmixed sensation. We, however, when we see a light at once perceive it as well as feel it; that is, we recognize its locality, we acknowledge its likeness or its unlikeness to previously-remembered perceptions of light, and we contrast it at the same time with the darkness or the differently-coloured light which surrounds it. In short, the three great elements of mind—the perception of agreement, the perception of difference, and the power of retentiveness—are all brought into play.

The relative definiteness of our various sensations affords a good measure of the rank of their respective senses. When we find the element of duration feebly marked in Taste and Smell and very strongly perceptible in Sight and Hearing, we at once rank the former as less refined than the latter. We also find the distinction to hold good in other characters—the first pair wanting definition in every respect when contrasted with the last pair, and approaching to those merely organic sensations which refer to bodily conditions of hunger or repletion, freshness or suffocation, and the like. This is the ground for the classification given in more detail in the article on the *SENSES*.

One sensation is found to interfere with another of like kind. The lower the sense the more liable is it to this kind of disturbance. Thus, if one hand be plunged into hot water and the other into cold, then upon plunging both hands into the same mass of lukewarm water this

will feel cold to one and warm to the other hand. Or going a step higher, if we taste a strong saline solution, a much weaker solution will be unable to affect our sense, if tasted quickly after the first. The sense of smell is clouded altogether by a cold in the head. The higher senses are far less liable to interference, and capable of much more fatigue. It is worthy of remark that the less definite sensations, those which approach in their character the sensation of organic life, are received through sense organs which are placed at the entrances of the two great cavities of the body, the respiratory and digestive channels respectively.

SENSES, THE, are the means whereby we know our own body and the external world. A sense is composed of three parts: a sensory organ, which may be affected or stimulated in some special manner; a nervous track, along which the stimulus may pass; and a nerve centre, to receive it. Thus in the sense of sight, the eye, the sense-organ, is stimulated in a peculiar manner by light, and by light only; this stimulus is gathered by the optic nerve, and so conveyed to its special ganglion at the base of the brain, where it is recognized as the sensation of vision.

It is probable that in animals of low sensibility the sensory organs, which manifestly must be mainly on the exterior of the body, are sensitive to all kinds of external stimulus; and that the sensations caused by varying stimuli differ very little in quality from one another, the animal probably acting much more from the varying degree of violence of the stimulus than from its varying nature. But it is obvious that as animals rise in the scale, great precision and economy would result from the differentiation of the simple uniform sense-cell into specialized organs, susceptible only to certain definite stimuli; one group of cells becoming sensitive above all things to the waves of sound, another group to the waves of light, &c. This differentiation of sensory organs implies a speedily following differentiation of the nerve centre which receives and acknowledges the sensation, and so by long evolution the senses become specialized in every part; and each has its outer organ, its inner organ, and its nerve connecting the two. The eye is not sensitive to sound, neither is the optic ganglion at the base of the brain; and further, even the optic nerve appears to refuse to carry other than light sensations. If the optic nerve is stimulated anywhere along its course, the brain sees a flash of light; if the eyeball is struck, and the optic nerve is stimulated in its fine ultimate filaments, "sparks fly from the eye;" and a still more violent flash is produced if the nerve is pressed after leaving the eyeball. A diseased ear, if the aural nerve is affected, gives a sensation of sound, and so on for the other senses. Yet a closer examination, coupled with experiments upon the various nerves, leads the physiologist to pronounce that these nerves are not really specialized, but that they are nerves like all others; that they are, in fact, mere telegraph wires faithfully carrying the messages given to them. It is the optic ganglion which refuses to receive any other than light-messages, the aural ganglion which rejects all but sound-messages.

For very many ages five senses have been recognized as so pre-eminent in value that they have come to acquire the title of *senses* almost as an exclusive possession. These are the senses of Sight, Hearing, Touch, Smell, and Taste. Remarks upon each of these wonderful faculties, by whose aid the whole complex structure of mind is built up, are offered under the special articles bearing their names, save in the sense of Hearing. The articles SOUND and LIGHT also bear upon the subject. Somewhat extended articles will be found upon each of the sensory organs, EYE, EAR, SKIN, NOSE, and TONGUE; and these of course incidentally deal with the senses for which those organs exist. Finally, the article SENSATION deals with the general considerations embracing the whole subject.

But the historical "five senses" by no means exhaust the special varieties of sensation perceivable by the brain. Taking a sense as a stimulus from an external agent acting on some distinct bodily organ or series of organs, and giving rise to a special sensation, we certainly must include a considerable number of less prominent senses if we desire to make an exhaustive classification. For example, the muscular system presents us with a large sense-organ, providing the brain with many sensations arising from external stimuli to which it alone of all the parts of the body is sensitive. We have the sensation of dead strain, as when we weigh something in our hand, and we can with ease train ourselves to distinguish between 19½ and 20 oz. What is this sense? It is not sight, nor touch, that gives us this knowledge, it is muscular feeling. Then, also, we get exertion coupled with movement, giving an entirely new set of sensations; and finally, movement without exertion, as that of riding in a carriage, yielding a third class unlike each of the former. We can discriminate continuance of muscular movement, extent of sweep, rapidity of speed, quite unaided by sight or touch. In fact we have here a sixth sense of great power.

It will not be necessary to apply the same scrutiny to other subordinate senses; for it will be evident on similar considerations that the following all fulfil the conditions of true senses:—Hunger and Thirst, Repletion and other digestive sensations, Suffocation and other organic sensations of respiration and circulation, Warmth and Cold, Muscular pains and fatigues, Organic sensations of Nerve, and Sex—since all of these have a special organ, with a special stimulus or object, and all yield a special sensation not to be mingled or confounded with any other.

All these last are referred by our latest authorities to one class, the class of "Sensations of Organic Life;" and it will probably occur to every thoughtful reader that the proper rank of such senses is with Taste and Smell, for all of these, while supremely important for the comfort and pleasure of life, yield none of the higher elements of mind. In a certain sense, they may be truly said to be lower forms of the great sense of Touch, but they are incomparably beneath Touch proper, the Touch of the Skin, an intellectual value. This is not to lessen their value, but the importance of their function. A man's life is but a burden to him if he be racked with muscular or nervous pain, if he is perpetually conscious of a liver or a stomach which refuses to do its work; but short of such pain as passes the limits of bodily endurance, such a man may live, in all its fulness, the highest life possible: he may suffer the tortures of a Coleridge or a Heme, and yet like them rise to immortality. But he who is born blind, deaf, and paralytic, is without most of what elevates man above the animals; and he who in later life loses sight, hearing, and touch is only saved from a like sad degradation by the accumulated stores of happier years.

The classification of the senses, then, may be thus set forth:—*First*, what we have termed the *Muscular Sense*, which, since it arises from a perception of the effort of the motor nerves, and not from a perception of the stimulus of the sensory nerves, is manifestly to be put in a division by itself. The muscular sensation of a pile of pence held out on the palm of the open hand is due to the sense of effort to keep the hand from being weighed down by the pence, that is, to the feeling called up by certain motor nerves which are exerting themselves to keep the hand steady; the sensation of touch which the coins cause is a true sensation, affecting certain sensory nerves, which appreciate it as the touch of metal, and not of silk or stone, and carry a message to the brain accordingly. The difference is quite patent.

Secondly, what we may term the *Senses of Feeling*, the senses not specially intellectual; and in using these terms it must be added that they are to be understood with great

limitation, for all senses have an intellectual side, and likewise an emotional side, or side of feeling. In calling Taste a Sense of Feeling it is meant that its intellectual power needs the wit and genius of a Brillat-Savarin to make perceptible, while a child acknowledges its importance on its mere non-intellectual or animal side. The Senses of Feeling are the group of sensations of Organic Life, Taste, and Smell.

Thirdly, what we have called specially the *Intellectual Senses*, the all-important powers of Touch, Hearing, and Sight. And the converse of what was said above holds true as to this class; namely, that while their office as furnishers of intellectual food is that which especially marks and stamps them, they are not only not devoid of emotional power, but on the contrary they yield our most exquisite pleasures of feeling. For who would compare the touch of the wum living velvet of a baby's cheek, the sound yielded by "the murmur of innumerable bees," or the sight of autumn leaves, all russet and purple and gold, with the taste of the riest eates or the smell of the richest perfumes from the shores of Ind? And these are little more than sensations of feeling, if we keep our minds from dwelling on the charm of newness and helplessness which surrounds the babe, the peaceful activity of the bees, and the tender melancholy of the trees left bare by the fallen leaves.

In this, as in all other classifications, to draw too tight a line is unnecessary and absurd, but it would be equally wrong not to recognize the existence of fundamental distinctions.

SENSIBILITY, as a physiological term, signifies the power to excite sensation. The various sense organs are not homogeneous as to this—they vary greatly in their parts. In the eye the sensibility varies from *nil*, at the entrance of the optic nerve, to the extremely delicate point of the "yellow spot," crowded with the structures called cones, to which the sensibility of the organ is referred. The same remark serves for the varying sensibility of the tongue and the nose. In the ear, the pain caused by shrill sounds and the indifference to grave sounds are familiar to every one, and clearly show where the ear is the most sensitive. The skin varies enormously in sensibility. Weber's test for this is simple and ingenious. It consists in touching the skin of another person with the blunted ends of a pair of compasses, and gauging the sensibility of various parts of the organ by the power of the subject to distinguish between one point and two. Thus the thigh and the back can only detect two points when they are separated by thirty lines ($2\frac{1}{2}$ inches), whilst the palm of the hand only begins to confuse the two points at five lines (less than half an inch); the nose distinguishes the points at three lines, the lips at two lines, the finger-tips at one line apart. The tip of the tongue is the most sensitive spot of the ordinary skin, and that distinguishes two points half a line apart. Of course the subject must have his eyes closed during the experiment.

SENSITIVE FLAMES. The remarkable power of musical sounds to affect flames is of somewhat recent discovery. By suitable adjustment flames may be made to measure pressure [see **MANOMETRIC FLAMES**], and to emit musical notes when inclosed within tubes of proper lengths. [See **SINGING FLAMES**.] Beyond these powers of special flames all ordinary flames, say those which we nightly burn in our gas-jets, are most sensitive to sound when raised just to the point of flickering.

In March, 1858, Professor Leconte, at a musical party in the United States, observed that the gas flames were pulsating with the beats he heard in the music, and as the evening advanced and the gas company increased the pressure on the mains the movements were intensified. In 1865 Barrett began the use of tall flames, 14 inches high, and so on, and he found that an acute and loud sound shortened such a flame by several inches and caused the upper part

to spread sideways into a flat and very bright flame. Two years later Tyndall took up the subject at the Royal Institution, and it is especially to him that the finest observations are due. It was soon discovered that to acquire this sensibility the gas must be on the point of flaring. Now, flaring is caused by the friction in the orifice of a burner, and friction is always rhythmic, as the squeaking of any rusty cart-axle will tell us; when therefore the flame is brought closely to the point of flaring the slight but precisely regular rhythmic pulses of a musical tone will overthrow the balance of the flame even more thoroughly than a very considerable increase of pressure in the gas-main will be able to do. Taking an ordinary fish-tail or bat's-wing burner, with a heavy pressure from the main, and turning it just short of flaring, the flame will be seen to leap at very small sounds, and to a whistle or other shrill sound will probably take on a distinct form of flare, usually of seven points, of a somewhat star-like shape. Using a circular aperture, which yields a tall thin flame, the effect of sound is seen in the sudden dropping of the flame from flare-point to probably half its length; and if a pinched opening is used, so that the flame is flat, the tall thin ribbon of flame thus produced will rotate at a strong whistle, its plane turning 90 degrees, and returning to the original position when the sound ceases. An easy way of procuring such an aperture is to heat and then draw out a piece of glass tube till it gives an orifice of about a sixteenth of an inch. It is possible to produce from fine pin-hole apertures, and under heavy pressure, flames 2 feet long, and the sensitiveness of these flames is among the most exquisitely delicate things in nature. Reciting a piece of poetry before such a flame causes it to shorten variously to different vowels, always behaving alike to each particular vowel; that is, it distinguishes and obeys the **VOWEL TONES**, elsewhere described. To see it bow and curtsy, as it were, while the writer proceeds, is most remarkable. A musical sound, a rattle, the clink of money, &c., shakes it down to 8 inches high, and almost extinguishes its light, a hiss agitates it violently, a musical box makes it dance like a living thing. If the flame be a small one it is amusing to find that one can read by it only when it is whistled to; or gun cotton may be placed near it and fired by its lateral extension at the word of command.

Not only flames, but streams of air or jets of smoke are similarly sensitive to sound; and jets of water are also sensitive under special conditions.

SENSITIVE PLANTS. See **MOVEMENTS OF PLANTS**; **MIMOSA**; **DESMODIUM**.

SENTENCE (Lat. *sententia*) is the expression of a complete thought; in grammatical language, a *proposition*. It is a term used also, and with exactly the same meaning, in music as in speech, though, as will be presently seen, musical sentences are as far from admitting of precise description as musical ideas are far from the capacity of limited intellectual definition. Still, in music and speech alike, the sentence is the unit; both arts are made up in the last resort of sentences.

In speech we find sentences fall into two great divisions, *simple* and *compound*. A simple sentence has a subject and an assertion about that subject, which assertion we call the predicate: thus in "John writes well," "John" is the subject, "writes well" is the predicate. It is asserted or predicated of John that he writes well. A compound sentence is made up of several simple sentences; thus we may say, "John writes well, but he draws badly, and ciphers worse," and here we evidently employ three simple sentences to give the meaning of the one compound sentence.

Further, a sentence may be *complex*, that is, the subject or the predicate may have substantival or adjectival phrases qualifying them, and these phrases may be quite small sentences in themselves. We may say, "John writes well those things which he understands," and here "those

things which he understands" forms a subordinate substantial sentence required to complete the meaning of the predicate. Such an extension of the predicate is always required with a transitive verb, and is called the *object*. The above sentence does not become complex by the mere addition of an object, for "John writes history well" (where "history" is the object) is a purely simple sentence. It becomes complex because of its containing a subordinate (substantival) sentence. The following complex sentence has a subordinate adjectival clause qualifying the subject: "John, who is a diligent student, writes history well." It is evident that compound sentences may be composed of complex as well as of simple sentences.

In analyzing a sentence we follow out the thought of the writer as nearly as may be. First we select the subject of the sentence (in grammatical terms the nominative of the principal verb), and class with it all the subordinate adjectival sentences or phrases which qualify that subject. Sometimes the subject may be a clause of some length, as in the following: "It is excellent [to have a giant's strength]," where the words in brackets, collectively, are the subject. Next we select the predicate, generally in the form of a finite verb. If it is a transitive verb it will carry an object, represented by a noun or by a phrase of substantival or nounal character; and we put under the predicate its object thus found with the phrases, &c., attached to the object if there are any. Finally, we shall find there are frequently left circumstances of time, place, or manner qualifying the verb—adverbial phrases, or sentences, in short—and these we set down as extensions of the predicate. If the sentence is compound, we resolve it into simple sentences before proceeding as above.

The great requisite in a sentence is clearness; and this is attainable only by grammatical accuracy joined to perspicuity of thought and well-chosen arrangement of words. Words connected in thought should be placed near each other, and those unconnected should be separated from each other, so that the following sentence is ludicrously faulty: "Hence he considered marriage *with a modern political economist* as very dangerous" (D'Israeli's "Curiosities of Literature"). Mr. D'Israeli would have done better to have put the italicized words after the word "Hence." Punctuation is a very great help to clearness, but it also offers a dangerous snare to the unwary: a sentence that needs "stops" to make it intelligible is almost certainly faulty. In the prose of all the best writers scarcely any stops beyond the full stop are really necessary.

A musical sentence, as has been said, follows very much the same rules as a spoken or written sentence. To give a familiar illustration, "God Save the Queen" contains two co-ordinate musical sentences; the first one made up of three, the second of four sections. The whole tune is therefore a compound sentence. The "Old Hundredth" is a sentence in four sections, the first two forming a definite half-sentence, and the last two forming the corresponding or dependent half-sentence, connected, as it were, with the first by some imaginary musical "and" or "but." And just as with speech, so with music, a sentence must convey a clear thought, musically complete, and capable of analysis into its rhythmical elements of sections and phrases; and these latter, in all the very best melodies, respond to each other in the most subtle harmony of order.

SENTINEL or **SENTRY** (Lat. *sentire*, to look or perceive), is a term now applied to a soldier when placed on guard before a public building, on the ramparts of a fortress, or beyond the outposts of an army in the field. At night the sentry is furnished with a password, which must be given by everyone who desires to pass. Mounted sentries in outposts are usually termed *videttes*.

SEP'AL, in botany, is a term commonly applied to the divisions of the calyx. See **CALYX**.

SEPARATION. See **DIVORCE**.

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SEP'IA (Gr. *sēpia*). See **CUTTLE-FISH**.

SEP'IA, a dark brown pigment from the black juice ejected by the cuttle-fish (*Sepia officinalis*) to darken the water when pursued. One part of the juice will blacken 1000 parts of water. When dried this matter contains 78 per cent. of the pigment or melanin. It may be obtained pure by dissolving it in caustic potash, and precipitating the solution with an acid. It is quite insoluble in water, but remains suspended in it for a long time, imparting to it the black colour.

SE'POY (Hind. *sipahi*, a soldier, literally a bowman, from *sip*, a bow), a native soldier in the British army in India.

SE'POY MUTINY. See the articles **INDIA** (*Historical Section*), **CANNORE**, **DELHI**, and **LUCKNOW**.

SEPT (Lat. *septum*, a partition), a term almost synonymous with *clau*. Probably the lands of the Irish sept were divided by recognized fences or landmarks, whence the name.

SEPTARIA (Lat. *septum*, a partition), in geology, are hard nodular masses of concretions of origin [see **NODULES**, **CONCRETIONARY**] occurring in more or less regular layers in beds of clay, and so called on account of the presence of numerous small veins of calcareous spar, which divide them up—as by partitions—into several isolated though firmly united parts. The veins were originally small fissures or cracks, produced by the internal contraction of the nodule on solidifying, and owe their origin to the deposition of carbonate of lime by infiltrating water. Typical examples are to be met with in clayey rocks of almost all ages, but they assume unusual importance in the Eocene **LONDON CLAY** of Essex and the Isle of Sheppey; at Harwich and near Sheerness they are largely employed in the manufacture of **ROMAN CEMENT**, being obtained both from the cliffs and from outlying shoals in the bed of the sea.

SEPTEMBER, the ninth month with European nations, as the year is now divided. It consists of thirty days. The old Roman year commenced in March; September was then the seventh month, as the name implies, and the name has been kept to the present day. The Saxons called it *gerst month*, or barley month, because at this time they gathered in their barley harvest.

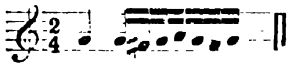
SEPTEMBER MASSACRES (Paris, 1792). See **REPUBLICS**, **FRENCH**.

SEPTENNIAL ACT, THE, of 1716, was an extension by an Act of Parliament of the previous Triennial Act, to which William III. at last agreed, after having previously refused to pass it, in 1694. The possible duration of Parliament was thereby increased from three years to seven years. It is certainly a dangerous principle that a representative body, as in this case, should vote its own prolonged authority, but the disturbed state of the country rendered the measure very desirable at the time, to avoid elections which might have gone against the new dynasty, and the Act has worked very well on several occasions since. It has been several times formally attacked. In 1818 Sir Francis Burdett proposed to replace it by a bill providing for annual parliaments; in 1830 Daniel O'Connell, by one returning to triennial parliaments. Mr. Tennyson tried thrice for its repeal (1833, 1834, 1837), and Mr. Crawford once (1843), but were defeated by large majorities.

SEPTET', any musical composition in seven parts. There are several septets occurring in operas—notably some beautiful strains for women's voices in Wagner's "Walküre"—but the term is better known as applied to septet compositions, and rather to instrumental than vocal pieces. The most famous septet (one of the finest pieces of music we have) is that by Beethoven for strings and wind. Hummel's and Spohr's septets, also fine works, introduce the pianoforte as well as strings and wind, and gain great fullness of tone thereby.

SEPTIMIUS SEVE'RUS. See **SEVERUS**.

SEP'TIMOLE, in music, a term employed to denote the division of a note into seven parts, as, for instance, a crotchet into seven semiquavers.



SEPTIMONTIUM, the great Roman festival of December, commemorating the foundation of Rome on the eternal seven hills. But the hills here meant are the seven small elevations or inclosed "rings" within the early city, and not that larger seven which came later on, by an easily intelligible change, to be regarded as embracing central Rome. See the article *ROMA*, section *History*.

SEPTUAGESIMA (Lat., seventy), the third Sunday before Lent, so called because the first Sunday in Lent, being forty days before Easter, was styled Quadiagesima, which signifies forty; and fifty being the next round number above forty, as sixty is to fifty, and seventy to sixty, therefore the Sunday immediately preceding Quadiagesima Sunday, being further from Easter, was called Quinquagesima (fifty) Sunday; and the two foregoing Sundays, being still farther distant, were, for the same reason, called Sexagesima and Septuagesima (sixty and seventy) Sundays.

SEP'TUAGINT (Lat., seventy), the name given to the earliest translation of the Hebrew Scriptures, viz. one made into the Greek language, probably during the first half of the third century B.C. Several legends have been preserved by the Jews concerning the origin of this version, but the simplest and most trustworthy account is that given by Aristobolus, a Jewish philosopher who lived in Egypt in the beginning of the third century B.C., who ascribed it to Demetrius Phalereus a translation had been made by others of the history of the Hebrews going forth out of Egypt and of all that happened to them, and of the conquest of the land, and of the exposition of the whole law, and the entire translation of our whole law was made in the time of the king named Philadelphos, a man of good birth, and under the direction of Demetrius Phalereus." Internal evidence shows that the version was made by Jews of the Alexandrian colony in Egypt, displaying as it does an imperfect knowledge of Hebrew on the part of the translators, and at the same time exhibiting the forms and phrases of the Macedonic Greek prevalent in Alexandria, with many Egyptian words. The translators appear to have worked from a text differing in many points from that now current, and some of the books, notably Job, Proverbs, Jeremiah, Daniel, and Esther, show important variations from the received Hebrew text. The Septuagint agrees much more with the Samaritan than with the Hebrew version of the Pentateuch. In some instances the variations from the Hebrew text may be accounted for by the similarity of Hebrew words and letters, but there are others for which no explanation can be given, and some seem to be purely intentional alterations. The version, however, was regarded with great veneration during the last century, and the first century A.D., and a large portion of the quotations from the Old Testament found in the New Testament are made from the Septuagint. It was long used by the Christian church, but when the Christians referred to it in their controversies with the Jews, the latter were led to examine it more closely, and finding that it differed materially from the Hebrew, it gradually fell into disrepute among them. Up to the end of the fourth century all translations of the Old Testament for the use of the Christian church were made from the Septuagint, and it was to put the Christians on a level with the Jews that Origen undertook his great work of the comparison of the different texts and versions of the Old Testament.

The chief ancient MSS. of the Septuagint are the *Codex Vaticanus* (Rome), the *Codex Alexandrinus* (London), the *Codex Sinaiticus* (St. Petersburg), none of which are

later than the fifth century, and the first and last of which probably date from the fourth. The principal modern editions are those of the "Biblia Polyglotta Complutensis" (1514-17); the Aldine edition (Venice, 1518); the Roman edition (Rome, 1587); a facsimile edition of the *Codex Vaticanus*, by H. H. Baber (1816); and the edition of Dr. Tischendorf from the *Codex Sinaiticus* (fifth edition, Leipzig, 1875).

SEP'TUM, in physiology, is a dividing structure, as, for instance, the septum of the nose, dividing the nasal cavity.

In architecture septum was the barrier in the ancient Roman (also retained in the early Christian) basilicas dividing the nave from the apse or chancel.

SE'QUENCE, in musical composition, is the recurrence of a figure, whether of melody or of harmony, at another pitch or in another key to that in which it was first heard. Thus Beethoven has a five-times-repeated sequence from a minor common chord to the major common chord a third below; as follows:—



Many things are allowable in a sequence which are not allowable in general writing, but the pattern on which the sequence is founded must be pure in itself. In the repetitions the imperfect triads on the leading note, and those on the Second and Third of the minor scale, may be used, the leading note itself may be doubled, &c. The intervals should keep their name, though not their quality. Thus in the above example the bass falls always by Thirds, but these are sometimes minor and sometimes major. Sequences which introduce discords are often of exquisite beauty. Sir George Macfarren gives the following ("Harmony," 1878) as a diagram of such a passage:—



SEQUEN'TIA (English, *sequence*) is the Latin term for a certain class of hymns which is often called *Prosa* (English, *prose*); and derives its name from its occurring in *sequence* to the gradual and the accompanying verses and antiphons, dividing the epistle from the gospel in the Roman Catholic Mass. It was introduced into the liturgy in the ninth or tenth century, and its period of greatest favour was the eleventh and twelfth centuries, during which all our grandest *sequentia* were written. The Council of Trent struck out all but five, and these are remarkably fine specimens of mediæval monkish Latin poetry, rhymed and accented. The last two characters were unknown to correct Latin poetry, whence the curious misnomer of "prosa" applied to them.

"Dies Iræ" is the most famous and the grandest of all the *sequentia*, and was written by Tommaso da Celano in the twelfth century. It forms the main feature of the requiem music, the Mass for the Dead. It is in stanzas of three lines, rhyming. The first stanza is as follows:—

"Dies Iræ, dies Illa
Solvat scelum in favilla,
Teste David cum Sibylla."

"Stabat Mater" is not nearly so fine, but is still a noble work in the same form, and like "Dies Iræ" has exercised the pens of the greatest musical composers. Especially grand are the *Stabats* of Palestrina, Pergolesi, Haydn, Astorga, Rossini, and Dvorák. The "Stabat Mater" was written by Jacobus de Benedictis, early in the thirteenth

century. It is sung in the "Seven Sorrows of our Lady" on Friday in Passion Week, to a special plain-song tune, presumably also by Jacobus. The stanzas run in pairs, the third line of the first of the pair rhyming with the third of the second, as in the opening stanzas here given.

"Stabat Mater dolorosa
Juxta crucem lacrimosa,
Dum pendebat Filius.

"Jus animam gementem
Contristatam et dolentem
Pertransiit gladius."

"Lauda Sion," the sequentia used at the Corpus Christi, was specially written for that festival by St. Thomas Aquinas in the year 1261. It has been magnificently set in modern times by Mendelssohn.

"Victimæ Paschali," a translation of which is frequently used in the Anglican Church service for Easter Day, is the sequentia for that festival in the older church. Its author is unknown. It is the oldest of all, and certainly is as early as the ninth century.

"Veni Sancte Spiritus," the sequentia for Whitsunday, was written in the year 1000, by Robert II. of France; and is used in the English Church service as "Come, Holy Ghost, Creator, come."

SE'QUIN, the English term (from a French corruption) for the ancient Italian gold coin the *zecchino*, first coined at the famous zecca or mint of Venice. The sequin of Venice (still circulating in Egypt) is now worth 9s. 6d., the Austrian sequin (also only found in Egypt) is worth 2d. less. The sequin of Tuscany is just between the two, and the other sequins of Italy are worth rather less.

SEQUOIA is a genus of large coniferous evergreen trees belonging to the tribe TAXODIÆ. Two species of this genus are known from North-western America. They are distinguished by their round or ovoid male catkins, borne at the ends of slender terminal branchlets, and by the ovoid cones, either terminal or on short lateral twigs, with woody shield-shaped scales, having at the base from three to seven winged seeds. The Redwood (*Sequoia sempervirens*) is found from Upper California to Nootka Sound, never very far from the coast; upon the coast range of mountains it often forms considerable forests, to the exclusion of all other timber. It attains a height sometimes of 300 feet, and a diameter at the base of 15 feet. The young tree has a very graceful appearance, the straight tapering stem branching throughout, and the twigs being closely covered with flat spreading linear leaves in two rows, glossy green above and glaucous beneath. In old age the trunk bears short irregular branches only on its upper part, and the leaves are shorter and more rigid. The bark is red and deeply furrowed. The redwood has been a most valuable timber tree to the settlers. The timber is light, close-grained, strong, and durable; it resembles in appearance red cedar, but is darker. It splits readily and evenly, so that it may be made into planks and boards without the use of the saw, and in some places has been largely used for fencing. It polishes well, and from its durable character is used for cabinet-work and for building purposes. The redwood has been known in England for long as an ornamental tree, growing well in warm situations and attaining a height of 30 or 40 feet.

The Wellingtonia (*Sequoia gigantea*), the big or mammoth tree of the Americans, is confined to the western flanks of the Sierra Nevada, being found in groves at considerable altitudes. It was first discovered in 1850 in the mammoth grove of Calaveras. With the exception of the Australian Eucalypti the Wellingtonia is the largest tree known, attaining a height of from 300 to 450 feet, and a diameter of over 30 feet; at the base the ridges of the thick red bark stand out in great buttresses, so as to give a diameter in large specimens of over 100 feet. The young

tree grows very fast, and is less graceful in appearance than the redwood. The leaves are awl-shaped, short, rigid, pointed at the apex, and closely adpressed. The tree when old has a cylindrical head with short branches; the growth in maturity is very slow. The cones are rather larger than those of the redwood, 1½ to 3 inches long, and thicker at the base. The wood is not very valuable, but is used for cabinet-work. The Wellingtonia was brought to England in 1853 by Mr. Lobb, where it is nearly handy and used as an ornamental tree.

SERA JEVO or **BOSNA-SERAJ**, the capital of the Austrian province of Bosnia, situated at the eastern end of the plain of Serajevsko-Polje, on both banks of the river Miljacka. It is a considerable town, and was formerly chiefly built of wood. In 1879 it was almost entirely destroyed by fire. This was the fifth time that the town had been burned within the past four centuries. The previous conflagrations when but it in ashes were in the years 1480, 1644, 1656, and 1687. Since the last conflagration the town has been rebuilt, and in 1885 some fine government buildings were opened. A Roman Catholic cathedral has been erected; and the chief mosque, built in 1532, has been restored. One of the old Turkish consulates has been converted into a public garden. The population is about 50,000. The town is the centre of commerce between Turkey, Rumania, and South Germany.

SERA'GLIO, properly *Serai*, the palace of the sultan at Constantinople. In this sense the word is also applied to the houses of foreign ambassadors resident at his court. The serai of Constantinople stands in a beautiful situation, on a head of land projecting into the sea, called the Golden Horn. The walls embrace a circuit of 3 miles, and include several mosques, spacious gardens, and buildings capable of accommodating 20,000 persons, though the whole number of inhabitants is less than 10,000. If a part of the building which is occupied by the women of the sultan has been improperly called *seraglio*, and hence the word has become synonymous with *harem*, in Arabic word which means "sacred spot," or that part of the house where the women and daughters of the Mohammedans reside.

SERAMPUR (*Serampour*), the headquarters of Serampur subdivision, Hugh district, Bengal, is situated on the west bank of the Hugh River, opposite Barrackpore. Serampur was formerly a Danish settlement, and remained so until 1815, when all the Danish possessions in India were ceded by treaty to the East India Company in payment of £125,000. It is a station on the East India railway, 13 miles distant from Calcutta. Serampur is historically famous as the scene of the labours of the Baptist missionaries, Carey, Marshman, and Ward; the mission still flourishes, and its founders have established a church, school, college, and noble library in connection with it; there is also a dispensary here. *The Friend of India*, a weekly paper published at Serampur, once rendered this town conspicuous in the history of Indian journalism. The chief manufactures are paper and hats. The population is about 25,000.

SERAPEUM (Gr. *Serapion*), a temple in honour of the god Serapis. The most famous was that at Alexandria, to which the great Alexandrian Library was attached, part of which the so-called Pompey's Pillar is supposed to be a memorial. There was another at Memphis, approached by a remarkable avenue of colossal sphinxes, which was extolled from the sands of centuries by M. Mariette in 1850. A third temple of Serapis, near Naples, was examined in 1750.

SER'APHIM, plural of Seraph, in order of angels described by Isaiah as in immediate attendance on the Supreme. They are described as being of human form, but with six wings, with two of which they fly, and with four veil their face and feet in reverence. They are the

messengers of the Almighty, whose praises they chant continually (Isa. vi. 2, 3, 6, 7). The Hebrew word means "lofty ones" or "princes."

SER'APHINE, a keyed wind instrument, the tones of which were produced by the play of wind upon metallic reeds, as in the accordion. It consisted, like the organ, of a key-board, wind-chest, and bellows. By means of a pedal, the stress of the wind upon the reeds might be so regulated as to give the expression of accent, crescendo, and diminuendo. The harmonium has entirely replaced it.

SERA'PIS was an Egyptian divinity, and the name is, as we may suppose, an Egyptian word. Some suppose that there was an ancient deity of the name, who must be distinguished from the more recent deity imported into Egypt in the reign of the first Ptolemy. Ptolemy saw the god in a dream, and the traveller Sosibios recognized it, by his description of his vision, as the image of a god he had seen worshipped at Sinepe. The god being like both Osiris and Apis, was named by the Egyptian priests Osorhapis, quickly corrupted to Serapis. Like Osiris, Serapis was judge of the dead. There were forty-two temples erected to Serapis in Egypt, to one of which was attached the famous library of Alexandria. When Egypt passed under the dominion of Rome the Romans also adopted the worship of the god, representing him as a sort of incarnation of Jupiter, distinguishable chiefly in appearance by his wearing a peculiar head-dress of cylindrical form. Antoninus Pius introduced the worship of Serapis into Rome itself, where it quickly became very fashionable, but as much licentiousness was afterwards introduced into the ritual, the Senate abolished it. A great part of the favour accorded to the Serapian worship was due to the success of the oracles which the priests conducted in most of the temples of the god. The worship of Serapis (or Saapis) was also established in several parts of Greece. At Alexandria in Egypt it was abolished in 398 by the Archbishop Theophilus.

SERAT', AL, the passage by which souls have to cross into heaven in the Mohammedan conception of the future world. It is as narrow as the edge of a scimitar, and only the souls of the just are able to keep their balance along the perilous way; the wicked stumble, some early and some late, according to their wickedness, and are received into realms of varying punishments beneath.

SERBONIAN BOG or **SIRBO'NIS**, in Greek and old, in Sanskrit, is a vast lying between Egypt and Palestine, and, together with the desert, effectually dividing those two countries. It was originally a lake, and its extent was 1000 stadia, or according to Pliny it was 1500 fms long. It shallowed, probably from geological causes, and became a dangerous watery waste. Legends of wonders lost in it are told by the Greek poets; and the monster Typhon (*Typhôn*) was sometimes fabled to lurk in its bowels. The modern lagoon of *Sabakat Bardawal*, named after a king of Jerusalem of that name, is always considered to represent Serbonis as far as it is actually concerned. The reference to Serbonis in Milton's magnificent description of hell will occur to most readers:

"A gulf profound as that Serbonian bog,
Between the Danube and Mount Caucasus old,
Where armies whole have sunk."
—*Paradise Lost*, ii.

SEREIN, rain which fall from a cloudless sky, a phenomenon not very uncommon in the tropics. The term is derived from the French word *seren*, night-dew, the moisture of a cloudless evening. The phenomenon probably depends upon the enormously greater radiative power of aqueous vapour than of dry air, sometimes estimated at 100 to 1 times as much. Hence the aqueous vapour may condense into the fine rain or falling dew of sercin by its radiation.

SERENADE, a word adopted from the French *serénade*, which has been formed from the Latin *serenus*. A serenade is properly music performed in the open air on a serene night, but is generally restricted to a musical performance given at night by a lover to his mistress under her window.

SERENA'TA, a variety of musical composition. The word *serenata* in Italian merely means the calm, warm night-air of summer. Hence it came to mean also a musical composition that would be suitable for performance on such an occasion in honour of a beloved mistress or a renowned prince. Thus also the shorter "serenade" is justified. Musically, the original term serenata is retained for a much longer composition than the serenade. In fact, many of its best examples are what we should now call cantatas: witness the grand work which still reminds us of this half-forgotten term, Handel's serenata of "Acis and Galatea." Handel applied the term to three of his works. There are a considerable number of serenatas for instruments alone, by Haydn, by Mozart, and by Beethoven, not to mention other great composers. Mozart is generally felt to have been the greatest master in the style. His clever serenatas have a number of contrasted short movements, differing from the "suite" in there being no gavotte or bourrée. Nearly all have a march and a minuet, among other movements. The serenata was, in fact, the mediation between the old *SUITE* and the modern *SYMPHONY*. Beethoven's serenata for violin, viola, and violoncello (commonly known as the "Serenade Trio"), is a perfect gem in this style, containing a march, a minuet, a polacca, a scherzo, an air and variations, two adagios, and other movements.

SERF, another form of Lat. *servus*, a slave, has a special meaning of its own. While a slave could be bought and sold as any other chattel, a serf had many rights, though they were limited in extent, and his chief obligation lay in his being tied to the land in some particular estate and bound to do service for the lord of the manor. But he was able to acquire property; if his lord took it from him he could not, indeed, recover it, but it was his as against any one else. Serfs, wherever they are found, are undoubtedly the degraded and enslaved original possessors of the land. Their conquerors have been forced (probably by fear of insurrection) to allow them the right to live and a little more. To kill or maim a serf, even in the worst times of feudalism, was an offence punishable by heavy fine. In some cases such an injury was held to set the serf free.

The decay of serfdom in England and France began with the church, which took early opportunity of freeing its serfs. Later on the barons, pinched for money by the Crusades, were glad to let their serfs buy their freedom at recognized rates. A custom grew up in England by which a serf who had worked or traded as a free man without challenge for a year became free by that fact. In this way serfdom died out gradually of itself. Almost the last notice of it to any large extent that we have is the commission sent by Queen Elizabeth, in 1574, into the West of England, to arrange with the royal serfs there and settle the prices of their freedom with them. After about the year 1600 serf-usages only existed here and there in isolated cases, as, for instance, in the Scottish custom of tying a miner to one coal mine or salt mine. He was free at first to choose another occupation, but this once chosen he was tied to it for life, and his children were so tied after him. This curious piece of serfdom lasted down nearly to the present century, being only abolished in 1775.

France nominally enfranchised her serfs before England, for there is an edict of Louis X. of the year 1316 naming the price of freedom for the royal serfs. But notwithstanding this the usages of serfdom really lasted almost intact in France down to the great Revolution. Miss Martineau's

powerful sketch, "The Peasant and the Prince," is strictly true in every detail; and further, if the serf were strong enough to move away from the land to which he belonged, and thus endeavour to emancipate himself, the lord could follow him and demand his *taille* or serf-tax. In Germany serfdom lasted to the beginning of the present century in a modified form, and its last usages were then swept away by Von Stein. In Italy the great wars of the Renaissance epoch put every man who could fight into a condition to claim his liberty or some lesser privilege as a reward for his courage. By the fifteenth century, quite a century before England had freed herself of serfs, serfdom had died out in Italy.

In Russia a very curious state of affairs took place. The Russian *mir*, or village community, was as free as the Teutonic *mark*, and as democratic. Every member of the *mir* was equal, and the land was in common. It took centuries for the great Russian nobles to degrade this free, if barbarous, people to serfdom; but at length, at the very moment when the England of Elizabeth was shaking off her shackles, the Russia of Boris Godunov had just finished enduing herself with the chains of serfdom. The only difference (and that was a great one) was that in Russian serfdom the land still remained to the *mir*, the serf being tied to the soil which was nominally his own, and in respect of which he owed many and heavy fines and services to his lord. It was not till March, 1863, that Alexander II., "the liberator of the serfs," was able by one great ukase to free the serfs throughout his vast empire and grant them perpetual usufruct of their holdings.

SERGEANT or **SERJEANT** (Lat. *serriens*; Fr. *sergent*) is a non-commissioned officer in a troop of cavalry or in a company of infantry. His duties are to drill or instruct in discipline the recruits of a regiment; and on parade to act as a marker or guide in the performance of the evolutions. The sergeants of infantry are now armed like the rest of the troops. Four or six sergeants are charged with the duty of guarding the colours of the regiment; they constantly attend the officers who carry them, and are called colour-sergeants. One sergeant in each troop or company is appointed to pay the men, also to keep the accounts relating to their allowances, the state of their necessities, &c. There are four sergeants and one colour-sergeant to each company. Their daily pay varies from 2s. 1d. to 5s. 1½d.

The sergeant-major is an assistant to the adjutant, and keeps the roster for the duties of the sergeants, corporals, and privates. The quartermaster-sergeant is one who acts immediately under the quartermaster of a regiment in all the details relating to the quarters of the officers and men, the supplies of food, clothing, &c. See **SERJEANTS**.

SERGEANTY, GRAND AND PETTY (from the Latin *serriens*, through the French *sergent*), feudal tenures introduced into England at the Norman Conquest. The ordinary baronies were held on military service and other usual feudal services, but *grand serjeanty* added to this the obligation to attend the king in his court at least thrice a year and whenever summoned, and was forbidden to be alienated or divided by its holders. It was especially the estates held under grand serjeanty which were called baronies (*per baroniam*) and were considered as forming the "greater baronage." The lesser baronage held by knight-service only.

Petty serjeanty was quite another matter, referring to a minor kind of socage tenure involving no personal service, but merely a rent or acknowledgment payable in some military way, as by the due of so many arrows or other warlike stores.

SERGIUS was the name of four of the popes. **SERGIVS I.**, of a Syrian family who had settled at Palermo, succeeded Conon in 687, resisted Justinian II. in 692, when the emperor wished him to agree to the findings of the Quini-

sexan Council (which still remains the great basis of the discipline of the Greek Church), and successfully withstood an attempt to depose him by force because of his refusal, 694. A second attempt, led by the exarch of Ravenna, was more successful, and Sergius was driven into exile. He died 701. This pope is interesting to Englishmen as having baptized Ceadwalla, king of Wessex (685-689), who repented of his many cruelties, and went to Rome to receive pardon and baptism in 689, dying there while yet wearing the white robe of baptism.

SERGIVS II. was a Roman of noble birth, and filled the see from 811 to 817. At this time the emperors claimed to rule the election of the popes, and the Emperor Lothar sent his son Louis with a Frank army to annul the election of Sergius, carried through without his consent. The Pope, by mingled flattery and menace, aided by the superstitious fear caused by a sudden lightning storm, succeeded in averting the danger and inducing the Frank king to recognize his dignity.

SERGIVS III. was more than once a candidate for the tiara, and apparently had to leave Rome for several years. In 904 he returned with an armed force at the invitation of the Romans, deposed Christopher (who became a monk), and was himself elected pope. He ruled for seven years, till his death in 911. This was a very dark time for the church, for it was under the reign of Sergius III. that the infamous Theodora and Marozia ruled Rome and the Holy See itself. The character of this pope has been loaded with almost every foul accusation; but it is only just to notice that it is one of the obscurest periods of history, and Littré, on whose testimony we receive the account, may, like Tacitus with the Roman emperors, darken his tints for the sake of literary effect.

SERGIVS IV. (*Petrus Bucapora*) was elected in 1009 to succeed John XVIII. He died in 1012. He is interesting as having changed his name from Peter to Sergius on election. It is believed that this was the first instance of what afterwards became the almost universal practice of the popes.

SERGIUS, Patriarch of Constantinople, was the great advocate of the Monothelite dogma, afterwards condemned as a heresy; and it was greatly owing to his influence that the Emperor Honorius published the "Ekthesis, or Exposition of Faith," in 638. The orthodox felt an awful triumph when both emperor and patriarch suddenly died, some say on the very day of the proclamation of the "Ekthesis" on the gates of Santa Sophia at Constantinople, at all events closely upon that time.

SERIES, in mathematics, is a name applied to a set of terms arranged in any recognizable order, so that from a certain number of terms we can find the mode of progression and the limit of the series, or the sum of any given number of terms or other particulars. Some series are unlimited, and in this case the main problem is the examination of the convergency or divergency of the series.

The simplest forms of series are the arithmetical, geometrical, and harmonical progressions, which have been treated of elsewhere in this work. The abstruse forms of infinite series are quite unsuited for these pages, but the nature of the problem generally attacked may be given. If the series be discovered to be such that its successive terms diminish until they become almost zero, then the sum of the series (although its terms are infinite in number) may be computed with some approach to accuracy, because beyond a certain point the terms are too small to signify. If, on the other hand, the terms diverge so that each one grows larger, it is manifest that no such sum or average can be attained.

SERINETTE, a very small organ for playing a simple melody, used (or said to be used) in the old times of the monarchy to teach canary-birds (*serins* in French) to whistle the melody, by constantly repeating it. Some of

these are elegant little instruments, inlaid and carved very beautifully.

SERINGAPATAM (*Srirangapatnam*), the old capital of the state of Mysore, is situated on an island of the same name in the Kaveri (Cauvery), 75 miles S.E. by road from Bangalore, and 10 miles north-east from Mysore city. The island of Seringapatam is about 3 miles in length from east to west, and a mile in breadth. The fort stands at its upper or western end, immediately overhanging the river. The defences are imposing for their massiveness, though not constructed on scientific principles. The whole remains in almost precisely the same condition as it was left after the siege, even to the breaches, except that a luxuriant growth of trees has been allowed to spring up. The island of Seringapatam yields valuable crops of rice and sugarcane, which are watered from a canal originally constructed by Tipu, and brought across from the mainland by an aqueduct. The population is about 11,000.

The name is derived from Sri Ranga, one of the forms of the god Vishnu, who is worshipped by the same title on two other islands lower down the Kaveri, Sivasanmudram and Srirangam; but his temple here takes first rank of the three, as *Adi Ranga*. Local legend relates that Gautama Buddha himself worshipped at this shrine. According to a Tamil MS. preserved in the Mackenzie collection, the site had become overgrown with jungle, and the temple was rebuilt in 891 A.D. during the reign of the last Chola or Konga sovereign. In 1133 the Vishnuvite apostle Ramanuja received a grant of the island, with the surrounding country, from a king of the Ballala dynasty. The fort is said to have been founded in 1454 by a descendant of one of the local officers or *kolahurs* appointed by Ramanuja. Seringapatam first appears in authentic history as the capital of the viceroys or the distant Hindu emperors of Vijayanagar, who took the title of *Srirangapatayal*. Turumala, the last of these viceroys, surrendered in 1619 to Raju Wodeyar, the representative of the rising House of Mysore. Hereafter Seringapatam remained the seat of government until the downfall of Tipu Sultan in 1799.

The existing fortifications were almost entirely constructed by Tipu, who there sustained a siege from British arms. In 1791 Lord Cornwallis, the governor-general, commanding in person, advanced up to the walls, but was compelled to retire through want of provisions. In the following year he won a decisive victory in the field, and had almost taken the city on all sides, when Tipu purchased peace by the cession of half his dominions. In 1799 Seringapatam underwent a celebrated siege. It was invested by the British and the allied forces, about 31,000 strong, under General Harris, on April 6, and was stormed and captured on 18th May, after four days' bombardment, and a loss to the British of 1164 killed and wounded. The assault was led by General Baird, and Colonel Wellesley, afterwards Duke of Wellington, participated in it. Tipu was killed, and 929 pieces of ordnance, together with enormous quantities of treasure and jewels, fell into the hands of the victors; £1,100,000 in prize money was divided among the troops. After the capture, the island of Seringapatam was ceded to the British Government, whose property it still remains, being leased to the state of Mysore for an annual rent of £5000. The residence of the restored Hindu rija was removed to Mysore city, and Seringapatam immediately fell into decay. Dr. Buchanan Hamilton, who visited the place in 1800, returned the population at 31,895 souls, as compared with 150,000 when Tipu Sultan was at the height of his power. An outbreak of epidemic fever accompanied this population, and in 1811 the British military headquarters were removed to Bangalore. At the present day the ruins of Seringapatam are almost deserted; and the place bears such a bad name for malaria, that no European traveller dare sleep on the island.

SERJEANT-AT-ARMS, the name given to two officers who are appointed to attend upon the Lord Chancellor and the Speaker of the House of Commons, respectively, on solemn occasions, and, either themselves or by their deputies, to execute the orders given to them by those dignitaries.

SERJEANTS or **SERGEANTS-AT-LAW**, were formerly the only advocates recognized in the Court of Common Pleas. By the 9 & 10 Vict. c. 54 it was, however, provided that all barristers-at-law, according to their respective rank and seniority, should have equal right and privilege of practising, pleading, and audience in the Court of Common Pleas with the serjeants-at-law.

The serjeants formerly occupied three inns or collegiate buildings for practice and for occasional residence, situated in Chancery Lane, Fleet Street, and Holborn. Lately they had no other building than Serjeants' Inn, Chancery Lane. Here all the common-law judges had chambers, in which they disposed of in a summary way, and with closed doors, of such matters as the legislature expressly intrusted to a single judge, and of all business which was not thought of sufficient magnitude to be brought before more than one judge, or which was of a nature too urgent to admit of postponement.

It was formerly necessary that judges should have been serjeants-at-law, and if not already in possession of that dignity, it was formally conferred upon them prior to their elevation to the bench. The Judicature Act of 1875, however, among the numerous changes it introduced, removed this obligation, and no further appointments of serjeant-at-law have been made. In fact, provision having been made for the sittings of judges in chambers, Serjeants' Inn, Chancery Lane, was sold by auction in 1877. The best work of reference on the subject is "The Order of Coif," by Serjeant Alexander Paking (London, 1884).

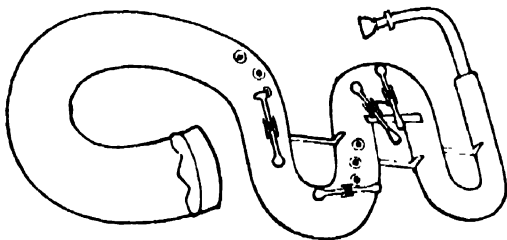
SEROTINE (*Vesperugo serotinus*) is a British species of Bat, nearly allied to the *Noctule* (*Vesperugo noctula*). This bat is about 2½ inches in length, covered with a soft silky fur, reddish-brown above, yellowish-gray below. It is widely distributed over Europe and temperate Asia. In France it is tolerably common, frequenting forests. In England it is rather rare, occurring chiefly in the south-eastern counties. Like the noctule it appears late in spring and flies late at night. It is very solitary in its habits.

SEROUS FLUIDS and **SEROUS MEMBRANES**. See **SERUM**.

SERPENS (the Serpent), a constellation which is astronomically distinguished from Ophiuchus (or Serpentarius), but not mythologically, being the serpent carried by the serpent-bearer. The windings of the figure bring it in contact with Aquila, Ophiuchus, Libra, and Hercules. It is to be found partly in the Northern, and partly in the Southern Hemispheres of the Plate **CONSTELLATIONS**, at the border of the Plate against the words November and December.

SERPENT (musical instrument), a long conical tube of wood covered with leather, about 8 feet long, having a mouthpiece, ventages, and keys, and bent in a serpentine form. The compass of the serpent is from B flat below the bass stave to c' on the treble stave, including every tone and semitone between these extremes. Its use is now nearly superseded by the **OPHICLEIDE** as an orchestral and military instrument, though it is still used in the music of the Roman Catholic Church. The bore of the serpent increases from ¾ inch to 4 inches. It has no bell. The mouthpiece is a cup like that of the horn family. The peculiar shape of the instrument was rendered necessary by the requirement of the fingering, but as the left hand (nearest the mouthpiece) is on a descending portion, and the right hand on an ascending portion, the fingering of the two hands is reversed—a most awkward arrangement.

The scale is most irregular, the distances of the holes following no known law, and the tone is consequently variable and imperfect. There are a few parts for the serpent in Mendelssohn, in Auber, and in Wagner's early works, but they are now always taken by other and more perfect instruments. The invention of this curious and very



ingenious instrument is attributed to Edmé Guillaume, a canon of Auxerre, who, in 1598, constructed it as a modification and improvement of the old *bass-zinken*, by twisting the tube and otherwise altering it.

SERPENT WORSHIP. The serpent has taken a very important place in the history of many ancient religions, and it is still an object of veneration among several of the uncivilized peoples of the present day. In the early dawn of religious feeling any object that excites feelings of wonder and awe becomes at once an object of worship, this being especially the case when the observer has any reason to fear that which he sees, and there has always been an atmosphere of mystery and terror surrounding the serpent. A creature that moved without feet, swam without fins, and climbed without hands, would naturally give rise to emotions of wonder similar to those expressed by the writer of Prov. xxx. 19, while the terrible and mysterious death which followed the bite of many kinds of serpents would be quite sufficient to invest them with supernatural powers. Once accepted as an object of worship or sacred symbol, the natural conservatism of the priests and religious officials would tend to retain it in spite of the development of religious ideas. In ancient Egypt the serpent was worshipped as an *agathodamon*, the symbol of health and life, while the Platonians adored it as a beneficent genius. The attribute of wisdom repeatedly assigned to the serpent in the Hebrew scriptures is also given to it by the Chinese, who use the serpent as a symbol of superior wisdom, and assign serpent bodies to the *ten hoangs* or kings of heaven. Under the shape of a dragon the serpent is also employed by the Chinese as a symbol of power and dominion. Other nations fluctuated in their conception of the serpent, sometimes assigning to it attributes of wisdom and power, and at other times using it as an emblem of the evil principle. In the Hebrew Scriptures there are numerous references to the serpent, but most of them are merely allusions to its real or supposed natural powers. The part played by the serpent in the story of the fall, and the use of a brazen serpent by the Hebrew lawgiver, are well-known incidents of Old Testament history, and we find at a later period the people indulging in serpent-worship, and having their idol destroyed by a reforming king (2 Kings xviii. 4). In the mythologies of several ancient nations the primitive dread of the serpent, and the admiration of the heroes who first dared to assail it, are found crystallized into legend, as in the case of the python slain by Apollo, the hydra vanquished by Hercules, the dragon conquered by Persens, &c. Elsewhere the serpent, coiled in the form of a circle, was used as a symbol of eternity, while in the Norse legends we find the whole universe of men and gods held together by the embrace of one enormous serpent. Several of the African tribes of the present day who adore the serpent believe that the spirits of men sometimes pass into the

bodies of snakes, while in the case of other tribes the prevailing element in the worship is that of fear. Some of the negroes of Hayti worship a kind of harmless serpent found on that island, conducting their services at night and in secrecy, and associating them with horrible practices of licentiousness and cannibalism. Traces of a primitive serpent worship are also to be found in many of the remote districts of India. See also OPHIOLOGY and OPHIIDS.

SERPENTINE is an ornamental rock so called from the fact that its varied colouration imparts to it a fanciful resemblance to the brightly marked and mottled skin of a serpent. From a chemical point of view it is a hydrated silicate of magnesia, tinged with ferruginous matter, and according to the condition of the impurities, assuming a green, greenish-gray, or deep red colour. It is slightly greasy to the touch, comparatively soft, and readily turned in the lathe; and its beautiful appearance when polished causes it to be largely used in vases, chimney-pieces, table-tops, and other smaller ornaments. The rock occurs chiefly in veins among crystalline strata, and probably results from the alteration of intrusive igneous masses containing an abundance of the mineral OLIVINE. The chief localities whence it is obtained in Britain are in Cornwall, Anglesey, and Connemara. A valuable variety is known as OPHIO-LITE.

SERPENTS and **SNAKES** are the common name of the Ophidia, an order of REPTILES. The serpents are distinguished by their very long, cylindrical flexible body, and total absence of limbs, except in a few the more rudiments of the hind pair. The body is covered with horny scales, which are formed by infoldings of the integument; the scales on the under surface are generally large and transversely elongated, and there may be large plates on the head. There is no distinct neck, but the body tapers gradually into the tail, the commencement of which is marked on the under surface by the position of the vent, and frequently by the arrangement of the scales in doubled rows instead of in single.

The backbone is made up of a large number of vertebrae from 200 to over 400. The vertebrae are so constructed as to combine strength with great mobility. They are concave in front and convex behind, and are united by a ball-and-socket joint. In addition to the ordinary articulating processes (zygapophyses), which are broad and flattened, a peculiar wedge-shaped process (vertebrale) with two articular surfaces, projects forward above the spinal canal, and fits into a corresponding cavity (zygantrum) of the vertebra next in front. All the vertebrae in front of the tail after the first bear ribs which are very mobility attached to short transverse processes, there is no sternum, but the ribs terminate in a cartilage which is attached by muscles to one of the broad scales of the belly. It is by the action of the ribs on the scales that serpents move. The movements of serpents consist solely of lateral undulations. There is no sacrum.

In the great majority of serpents there is no trace of limbs nor of their supporting girdles. Rudiments of a pelvis, which has no connection with the vertebral column, and of hind limbs are found in some serpents of the families Boidae (boas and pythons), Tortricidae (adders), and Typhlopidae (blind snakes). In Boa and Cylindrophis, not only is the pelvis present, but the femur and tibia also, the latter terminating externally in small fleshy claws. Stenostoma also, one of the blind snakes, has rudimentary femur.

In the skull of the serpent, the bones of the face are movable, making the mouth very dilatable. The squamate bone, by means of which the lower jaw is connected with the skull, is movable, and the squamale, with which it articulates, and the palato-maxillary apparatus are also movable; in addition, the ramus of the lower jaw are only united at the chin by soft tissue, and are capable of being

widely separated. The teeth are slender, curved backwards, and ankylosed to the bone which bears them. They are generally found on the palatine and pterygoid bones as well as on the maxillæ and mandible; in Python and Tortrix the premaxilla also bears teeth. In the vipers and rattlesnakes, the maxillæ bear a pair of long pointed teeth, the poison-fangs, each of which is pierced by a small canal, which communicates with the duct of a poison-gland; when not in use, the poison-fangs are concealed within the mouth, resting on the palate. In the other venomous serpents, the cobras and the sea-snakes, the maxillæ have also strong hooked teeth behind the fangs, and the fangs are not so deeply grooved as to form a canal.

The poison-fangs are a large pair of modified salivary glands; they lie above the maxilla, and beneath and behind the eye, communicating with the fangs by ducts. The effect of the venom induced into the blood by the wound of the fang is very various, the bite of some causing death to human beings in a few minutes, while that of the English viper is very rarely fatal to man, and not even serious to healthy people. The bite of even the same species, and that of the most deadly kinds, as the rattlesnake and cobra, varies at different seasons, and seems to be dependent on the serpent's vigour when the wound is inflicted. Warm-blooded animals, especially birds, succumb more rapidly and surely than cold blooded ones. The poison of a serpent seems to act by paralyzing the nervous system, and preventing the due motion of the blood. The poison has no effect when introduced into the stomach, so that sucking the wound is not dangerous unless the skin of the operator's lips is bitten. A tight ligature immediately above the part affected, or cauterization, are effectual, if applied in time. If the poison has been absorbed into the system, ammonia injected into the veins, brandy, and other stimulating drinks, sometimes arrest the fatal effects. Numerous remedies have been proposed, but the real antidote has not yet been discovered.

The tongue is long, slender, cylindrical, and forked at the tip, and retractile within a sheath. It is evidently an organ of touch. It is often regarded as the "sting" of the serpent by those who are ignorant of the true nature of the poison-fangs. The oesophagus is very dilatable, and thus, together with the dilatable character of the mouth, enables serpents to swallow prey many times their own size. The stomach is short and muscular, and the intestines are generally much looped, a single-lobed liver, spleen, and pancreas are present. Only one lung, the left, is, as a rule, developed, the other being rudimentary or aborted; the hinder portion of the lung is frequently a simple sac without cells. The ducts of the urinary and generative organs unite with the alimentary canal in a common cloaca which opens to the exterior by a transverse slit. The heart is elongated, and consists of two auricles and an incompletely divided ventricle.

The brain of serpents is small, and the cerebellum is merely a thin flat plate. The senses of hearing, smell, and taste are very defective. In the ear there is no tympanum or any external auditory meatus; serpents, however, are remarkably sensitive to musical sounds. The eyes are small, and are covered by a transparent skin, which is not divided into eyelids. This transparent eyelid is shed with the rest of the skin at the periodical moult. The skin or slough is always found inverted, and often quite entire. The hissing of serpents is produced by the slow escape of air through the mouth or nostrils.

The majority of serpents are oviparous, though most of the vipers are ovo-viviparous, the eggs being hatched within the parent's body. The eggs of the oviparous species are generally laid amidst decaying vegetable matter, and the mother takes no further care of them. Some of the pythons coil themselves round their eggs and hatch them.

The fascination said to be exercised by serpents seems

to be nothing more than the instinctive or hereditary terror excited in their prey, coupled, in the case of birds, with the instinctive maternal love for their nestlings.

Serpents glide along the ground with considerable rapidity; they can climb trees with facility, moving in the same way as on the ground, and often hang suspended from a bough which is grasped by their tail. When at rest they usually lie in coils, and when disturbed erect the head and fore part of the body in a spring of lightning-like rapidity. They swim by wriggling the body in the same plane as the surface of the water, and cannot move by vertical undulations.

The males are always smaller, more slender, brighter, and more active than the females. The colours of serpents are often very beautiful; some harmless serpents present a mimetic resemblance to venomous kinds, and so obtain protection from their enemies. See MIMICRY.

Serpents feed on living prey, such as rats and other small mammals, birds and their eggs, lizards, frogs, &c. The great constricting serpents, the boas and pythons, which kill their prey by crushing it in their folds, feed also on larger mammals, deer, antelopes, &c.

Serpents abound chiefly in warm climates. The English species are the Viper (*Pelias berus*), a venomous serpent, the harmless Common Snake (*Tropidonotus natrix*), and *Coronella lavis*, another harmless species.

Serpents are quite recent inhabitants of the world, first appearing in early Tertiary times; remains of serpents allied to the pythons have been found in England in Eocene deposits; the earliest known venomous serpent is from Miocene deposits.

Serpents have been, from all ages, regarded with a dread that has often passed into superstitious reverence. In Egypt and Babylon they were held sacred, and from the example of the people of the former country, the Israelites fell into the same superstition at periods of their history. The serpent was sacred to the god Æsculapius, who was himself worshipped under that symbol. The ancient people of Mexico also worshipped and sacrificed to serpents, and a similar practice has prevailed among some of the barbarous tribes of Africa. In spite of the dislike and awe with which people naturally regard serpents, they have been used as food in many countries, and were formerly regarded even in Europe as furnishing most efficacious remedies in many diseases. They are capable of domestication, and some make very harmless and affectionate pets.

The venomous serpents are divided into two groups, Proteroglypha and Solenoglypha. The first group has grooved poison-fangs and rows of maxillary teeth behind them; it includes two families, ELAPIDÆ (Plate, figs. 5, 6), containing the deadly COBRA (*Naja*), Bugarus, &c., and the HYDROPHIDÆ (fig. 7) or sea-serpents. The Solenoglypha have only poison-fangs in the maxillæ, and these teeth are grooved so deeply that the margins of the groove meet and form a canal; the head is triangular and broad at the base. This group contains the VIPERS (Viperidæ, figs. 3, 4) and RATTLESNAKES (Crotalidæ, figs. 1, 2). Most of the non-venomous serpents are contained in the group COLUBRIFORMIA (figs. 8-10), which includes the constricting serpents, the BOAS and PYTHONS (Boidæ), the Tree Snakes (Dendrophidæ), the Whip Snakes (Dryophidæ), &c. The remaining non-venomous serpents form a group, Angiostomata, to which the other groups are sometimes opposed, as Eurystomata. This group has the mouth not dilatable, the squamosal bone being small or absent, and the quadrate bone being attached directly to the skull: it contains three families, the Rollers (TORTRICIDÆ, fig. 11), Uropeltidæ, and the Blind Snakes (TYPHLOPIDÆ).

SERPULA is a genus of marine chætopod worms belonging to the section TUBICOLÆ. This worm constructs a calcareous tube, which is variously twisted and cemented to stones and other bodies. Some of the species live in

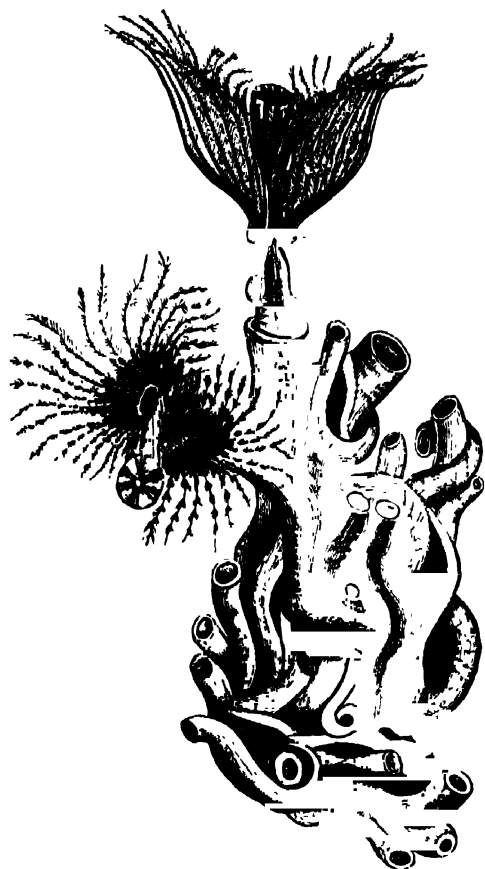
groups with their tubes adhering to one another and greatly intertwined. In the common species, *Serpula vermicularis*, the tube is about 3 inches long, round and tapering, and keeled on its dorsal surface. At one end is a circular aperture from which the animal can protrude itself; this aperture is closed by a horny operculum situated at the extremity of a tentacle. The worm itself is about an inch in length, with the appendages of the head modified into enormous fan-like structures, supported by a cartilaginous skeleton. These are the gills or branchiæ, glowing with the most exquisite colours. These gills consist of a number of comb-like ciliated filaments, disposed in two

instances of hermaphroditism have been discovered, which is extremely rare among fishes. The species are very numerous, and many of them are adorned with bright colours. Many of them are esteemed for food. Some attain a considerable size. Two species occur on British coasts. The Smooth Serranus (*Serranus cabrilla*) is common in the Mediterranean and on our southern coasts. The Dusky Perch (*Serranus gigas*) is also common in the Mediterranean, and is occasionally found in the British Channel. It is a large fish, those caught in the Mediterranean weighing as much as 60 lbs., while in the Indian Ocean it attains a still greater size; in our seas it is usually from 10 to 20 lbs. in weight. Its colour is a dark reddish-brown, becoming paler on the belly.

SERRICORNIA is a group of beetles belonging to the section PENTAMERA. The body is generally long and narrow, with the head retracted within the prothorax, the ventral portion of which (prosternum) is pointed behind and received into a cavity of the mesosternum. The antennæ are short or of moderate length, and generally toothed or serrated. All are vegetable feeders. The chief families included in this group are the BUPRESTIDÆ and the ELATERIDÆ (SKIPJACKS). The name Serricornia is often given to this group (which is then called STENOXI), combined with the MALACODERMÆ, which differ mainly in the simple character of the prothorax.

SERTORIUS, QUINTUS, was a native of Nursia, in the country of the Sabines. He lost his father very early, but his mother bestowed great care upon his education, and the son entertained for her through life the most tender affection. He first tried his fortune at Rome as an orator, but directing his attention to military affairs he distinguished himself in the campaign of Marius against the Cimbri and Teutones, and afterwards in Spain. In the first civil war Sertorius joined the party of Cinnæ and Marius, and helped Cinnæ to raise troops in Italy, and hold out against their opponents. When Marius returned from Africa (87 B.C.) and took bloody vengeance upon his enemies, Sertorius showed a noble moderation. In 83 B.C., having been appointed proconsul of Spain, he went to his province and began a new career, in which he displayed prudence and courage, tempered with humanity. He gained the good-will of the Spaniards by his just measures and his conciliatory behaviour. He was joined by Perpennæ and many men of the Marius party, and reduced the Roman commander Metellus Pius, sent against him by the now dominant senatorial party, to such extremities that in 76 B.C. the Senate sent to his support Cn. Pompeius (afterwards known as Pompey the Great) with a large force. Sertorius maintained himself in Spain against all the power of the Senate until B.C. 72, when he was treacherously murdered by his own adherents, at the head of whom was Perpennæ, who was jealous of his long supremacy of power. The history of his guerilla warfare, and of his pitched battles, is more like a romance than a history; and yet there is no doubt that Sertorius, during his long campaign, displayed the daring and ability of a great commander, combined with the prudence of a statesman and the unwearying activity of a common soldier.

SERTULARIA is a genus of HYDROZOA. Sertularia forms a plant-like branching colony of polyps attached to stones, shells, seaweeds, &c. Several species are common on British coasts under the name Coralline. The individuals of the colony occur alternately on either side of the branches, and are inclosed in horny cups (hydranths), which are without stalks. These little cups are furnished with a lid or operculum, which shuts down when the polyp is retracted. There are other horny cups (gonangia), formed also by the common covering of the colony, which contain modified polyps (blastostyles) carrying the generative buds. The Sea-oak Coralline (*Sertularia pumila*) is commonly found attached to seaweeds on our coasts.



(*Serpula vermicularis*.)

rows, one on each side of the mouth, so as to form a funnel, down which are driven, by the action of the cilia, the animalcules which form the worm's food. The body of the animal is provided with numerous bristles and hooks to bring about its protrusion and retraction. The animal on being disturbed can withdraw with the utmost rapidity into its tube, which is then securely closed by the operculum; but its protrusion is accomplished more slowly. Several other species besides *Serpula vermicularis* are found on British coasts. The tubes of some of the tropical species are a foot and more in length.

SERRANUS is a genus of fishes belonging to the PERCEN family (Percidæ). The species are the most typical of the sea-perches, being found on the shores of all temperate and tropical seas, especially in the latter; a few enter brackish water or even go a considerable way up rivers. They have an oblong compressed body, covered with small scales; there are distinct canine teeth in both jaws, as well as small band-like teeth, which are found also on the vomer and palatine bones; there is only one dorsal fin, with from eight to twelve short spines. In the European species

SERUM, the name given to the essentially liquid part of the blood, and also to the fluid secreted by certain closed membranes in the human body, such as the pericardium, pleura, peritoneum, &c., which are thence denominated serous membranes. The serum of the blood, which separates from the crassamentum during coagulation, has a pale, straw-coloured, or greenish-yellow colour, is transparent when carefully collected, has a slightly saline taste, an alkaline reaction, and is somewhat viscid to the touch. It has a specific gravity of 1.027 to 1.030 at 50°, and usually constitutes about three-fourths of the blood, the pressed coagulum forming about one-fourth. [See BLOOD.] The function of the serous fluids is to furnish a smooth moist surface, so that the two coats of the sac which the serous membrane forms may glide freely on one another, and the organ invested by the inner coat may therefore move freely. The heart, lungs, and intestines are examples of organs wrapped in such a double membrane and able to move smoothly. The quantity of serum in a serous membrane is very small, as the two surfaces are in actual contact, and no room is left for the collection of fluid. This, therefore, only occurs in dropsy.

SERVAL (*Felis serval*) is a species of carnivorous mammal belonging to the family *FELIDÆ* or Cats. It is abundant in Southern Africa, where it is named by some the leopard, and by others the bush tiger; it ranges as far north as Algeria. The body is over 3 feet long, tawny in colour, spotted with black; the tail is about 16 inches, and finely ringed with black. The legs are longer in proportion than in most of the cat tribe. The serval is bold and fierce, and will attack antelopes and other animals much larger than itself. When pursued it betakes itself to the thick brushwood in its native haunts, and when not pushed well on by trees and try to hide in the thick branches. The fur is greatly valued.

SERVANT. See MASTER AND SERVANT.

SERVE TUS, MICHAEL (whose family name was Michel Servetus) was born at Tullin, in Navarre, in 1511. He was the son of a notary, who sent him to the University of Toulouse in order to study the law, instead of which he appears to have devoted his attention principally to theology.

In 1531 he took up his residence at Basel, and there he first brooded those opinions which afterwards drew down upon him the censure of Calvin. His treatise on the doctrine of the Trinity, entitled "*De Trinitatis Erroribus*," was published by a bookseller of Basel in 1531, but the opinions which it contained were so contrary to those usually received, that the man feared to print it at Basel, and removed it to be done at Hagenau. In the following year Servetus wrote a second treatise, "*Dialogorum de Trinitate*," on the same subject, in which he corrected some errors in his former work, but did not retract any of the opinions.

When at Tullin at Lyons, where he remained three years, occupying himself principally with the study of medicine. On leaving Lyons he visited Paris, where he took the name of M.A., and afterwards of doctor of medicine.

In 1543 Pierre Palmier, archdeacon of Vienne in Dauphiné, called on Servetus at Lyons, induced him to return to France, and here he devoted himself to

correspondence with Calvin, which ended in a quarrel. In 1553 appeared his "*Christianismi Restitutio*," printed at Vienne, but without name or date. The work caused a great sensation. Servetus was suspected to be the author, was arrested and imprisoned, but would in all probability have been acquitted for want of evidence against him, had not Calvin, through the medium of Trio, forwarded to the Inquisition at Vienne a portion of manuscript and several private letters which he had received from the accused.

Servetus escaped from prison, where he had not been strictly guarded, but was condemned in his absence and burnt in effigy at Vienne, 17th June, 1553. He fled to Geneva, in which town he kept himself closely concealed, but was arrested through Calvin's influence on the day before that on which he was about to start for Zürich on his way to Italy. In prison he was treated with the greatest cruelty and denied the assistance of counsel. Calvin's own servant, one La Fontaine, appeared as the accuser. The trial took place on 14th August, 1553. Calvin drew up the articles of accusation, in which the calumnies against himself are alleged as part of the crime of Servetus; and further, he reserved to himself the office of disputant upon theological subjects with the prisoner. The trial before the council of Geneva was a mere mockery. After being detained five weeks in prison Servetus was furnished with a copy of the charges against him, to which he sent a brief written answer, and it does not appear that he defended himself in open court after 15th September. It was secretly determined in the council of Geneva to put him to death, but the matter being one of importance, it was thought advisable to send copies of his works and of the evidence against him to the clergy of the four Protestant cantons of Zürich, Basel, Berne, and Schaffhausen, and to ask their opinion concerning his guilt. These letters were despatched about the end of September. The replies all concurred in condemning the writings, but did not recommend that their author should be put to death, though Calvin chose to put that construction upon them, and on 27th October, 1553, Servetus was burnt at the stake.

His works have had an adventitious value imparted to them by their rarity. The "*Restitutio Christianismi*" contains a passage which has led some to say that its author well nigh discovered the circulation of the blood. (A good work of reference on the subject of this article is "*Servetus and Calvin*," by R. Willis, M.D., London, 1877.)

SERVIA is bounded N. by the Austrian territories of the Banat and Slavonia, E. by Wallachia and Bulgaria, S. by Macedonia, and W. by Bosnia. The length is about 200 miles, and the breadth 120 miles. The area is 18,800 square miles, and the population in 1884 was 1,902,419. The surface has a general slope towards the north, but is on the whole very mountainous, being traversed by ramifications of three great mountain chains—the Carpathians in the north-east, the Balkans in the south-east and south, and the Dinaric Alps in the west. The summits are often below 2000 and seldom exceed 3000 feet, except on the frontiers, where a height exceeding 4000 feet is attained. Many narrow and several wide valleys stretch between the mountain ranges, and in the flatter parts of the principality, particularly near the centre, along the banks of the Morava, and in the north along the banks of the Save and the Danube, several considerable plains occur.

The whole of the country belongs to the basin of the Danube, the principal streams being the Morava and the Drina, both of which fall into that river. The climate is somewhat rigorous in the more mountainous parts, but very mild in the valleys and plains. The winter temperature ranges from 6° to 14° Fahr., and in extraordinary seasons has sunk to -2° and -6° Fahr. Snow is very prevalent in the spring and autumn. The latter, however, is the most pleasant season of the year. Vegetation is vigorous, both in the mountainous districts and in the lower grounds, the former being generally covered with forests of excellent timber trees, among which, where the elevation is not very great, the walnut is conspicuous; and the latter having generally a fertile soil is well adapted for the ordinary and several of the finer fruits, the vine, cotton in the warmest spots, and for tobacco, rice, maize, hemp, flax, and the common cereals in almost every quarter, but five-sixths of the surface is uncultivated. The vine is somewhat widely cultivated, though but in-

different wine is made. In fact, but little wine is drunk in Servia, a spirituous liquor distilled from plums, called *slivovitz* or *rakia*, being used in its stead. Timber of superior quality would be a chief source of wealth if facilities were afforded for its export. Hogs, fed on acorns in the splendid oak forests, are largely exported, and many cattle, sheep, goats, and horses are reared in the mountains. Goat-skins are extensively exported. Leeches and valonia bark are also important articles of trade.

Servia has been an independent state since 1878. Formerly it acknowledged the supremacy of the Porte and paid an annual tribute, but was practically independent. In form the government is a hereditary monarchy, in which the prince or *hospodar* acts in conjunction with a senate or *skupochtina*, consisting of fifteen members named by him. The ordinary National Assembly, which is renewed every three years, consists of 178 members, three-fourths of whom are elected by the nation and one-fourth by the king. No military man may be a member of the Assembly or vote in elections. Besides this there is the Great National Assembly, which has four times the elected members of the ordinary, and is called when required to decide on vital and constitutional questions. It has no king's deputies. Every tax-paying Servian is eligible as elector. The criminal and civil code is founded on that of Austria. The standing army numbers about 18,000, but when all reserves are called out it is said to number 210,000 men. For administrative purposes the principality is divided into nineteen districts or *nahija*, subdivided into lordships or *kneshtina*, and communes or *sresore*. The capital is Belgrade. The inhabitants consist almost entirely of Serbs, who are of Slavonic extraction, speak what is considered the softest of all the Slavonic dialects, and have good physical forms, somewhat stouter, but less elegant than those of the Greeks. The religion is the Greek orthodox, but it is independent of the Patriarch at Constantinople. There are 5000 Roman Catholics, chiefly subjects of Austria-Hungary, with about 500 Protestants and about 4000 Jews.

Servia is divided into five dioceses, the bishops of which, with the metropolitan at Belgrade, form the Church Synod. The revenue and expenditure are each about £1,800,000 per annum. The national debt amounts to £8,000,000.

The railway system of Servia occupies an important position in regard to the European communications with Constantinople and with Egypt, as if a quick line of steamers ran from Salonika to Alexandria the overland route would be much shortened.

The Servians belong to the most advanced and gifted branch of the Slavonian family, and possess a rich national literature, but the country is still in a very backward condition. The water-mills, ox-carts, ox-goats, and ploughs are what they were in the time of the Romans; the men wear the *bracca* with leather bandages and shapeless leather foot-coverings of the Gauls and Britons; some of the huts are inclosures of unseasoned logs with the bark on them, thatch at the top, and a hole in the roof for the smoke to go through, and at the doors of these huts women sit spinning flax from distaffs. The Turk has disappeared from the villages. As mementoes of his long rule he has left the *fez*, which most villagers wear, some roadside fountains of good water—for the Turk was always particular about his water—and occasional orchards. Another memento of the Turk is seen in the slothful habits of the population. Accustomed to have their money wrung from them, the peasants worked just as much as was necessary to support them and pay the tax-collector his strict dues, but no more. They abide by this system still, but work less than before, because the tax-collector is less exacting, and they can luxuriate in idleness in token of their freedom.

History.—The original inhabitants of Servia were chiefly

Thracians. Conquered by the Romans during the early period of the empire, Servia formed part of Illyricum under the name of Mesia Superior. During the great migration of nations it was overrun by the Huns, Ostrogoths, and other barbarians, and subsequently was under Byzantine rule from the middle of the sixth till early in the seventh century, when it was devastated by the Avars. The latter were driven out by the Serbs, a Slavic people who had been living north of the Carpathians, and whose aid the Emperor Heraklios (died 641) had invoked. He allotted to them the depopulated regions, and introduced Christianity. Servia remained a vassal state of the emperors of the East: but a spirit of liberty was fostered by powerful and well-organized local governments, whose chiefs (*zhupans*) repeatedly attempted to make themselves altogether independent. But the imperial authority was fully restored in the latter part of the ninth century by Basil I., surnamed the Macedonian. Subsequently the Bulgarians held the ascendancy in Servia for a long period, but their power was broken by John Zimiskēs, and finally destroyed by Basil II. in 1018. Stephen Bogislav was the first Serb to found an independent principality, about 1013; his son Michael (1050–80) styled himself king (*krak*), and was recognized by the Roman see. Stephen's grandson Rodin (1080–90) extended his dominions, but was captured by the Byzantines, with whom his successor Vulkan or Vuk made peace in 1094. Urosh I. joined (1127–29) the Hungarians against the Greek emperors, laying the foundation of repeated alliances with Hungary; and the contests with Constantinople continued under his successors. Stephen Nemanja, grandson of Urosh II., founded a new dynasty in 1165. He conquered Bosnia and other territories, and made Rassa (now Novibazar) his capital, from which his realm was called the Rascian, but could not cope with the emperors of Constantinople. His son Stephen I. was crowned in 1217 as King of Servia, and his successors acquired much additional territory. The most illustrious of them was Stephen Dushan (1336–56), who had himself crowned czar. He conquered nearly all Macedonia, Albania, Thessaly, Northern Greece, and Bulgaria, and greatly improved the laws, learning, and trade. But conflicts among the governors of his provinces impaired his work, and most of his conquests were lost by his son, King Urosh V., whose assassination in 1367 closed this dynasty. He was succeeded by the *usurpator* (governor) Vukashin, who fought with the Greeks against the Turks, and conquered Salonika in 1369, but was defeated and fell in battle in 1371. Lazarus I. in 1371 established a new dynasty by conquering most of the Servian dominions. In 1389 he was defeated by Amurath I. on the high plains of Kosovo, and executed by order of the sultan, who had received a mortal wound from the hands of a brother-in-law of Lazarus. His son and successor Stephen, first as a vassal and then, in conjunction with the Hungarians, an adversary of Turkey, died in 1427 without issue, and was succeeded by his nephew George Brankovich. He combated his son-in-law Amurath II., together with John Hunyady, who, after repeated victories, was vanquished in October, 1448, also on the plains of Kosovo. The Sultan Mohammed II. completed the conquest of Servia in 1454, but in 1456 was compelled by Hunyady to raise the siege of Belgrade a year before the death of Prince George of Servia. The latter's son Lazarus II. obtained the succession by poisoning his mother and expelling his two brothers. He died in 1458, the last and the worst of his dynasty. In 1459 Mohammed II. incorporated Servia with Turkey, excepting Belgrade, which was held by the Hungarians until taken by Soliman the Magnificent in 1521. The Turks resented the heroic resistance of Servia by sending 200,000 of her citizens into captivity, and by exterminating whole families, while others emigrated to Hungary; and rapacious pashas ruled abominably for several centuries, and reduced the

country almost to a wilderness. Austria received Belgrade and most of Northern Servia at the close of her war with Turkey in 1718, but the peace of Belgrade (1739) restored the Turkish domination, and the Serbs were again subjected to dire calamities, especially by the excesses of the janissaries.

Their repeated applications for redress remaining unheeded at Constantinople, the Servians, in 1804, availing themselves of the revolt of Passwan Oglu, pasha of Widin, rose in arms throughout the country against the Porte. They chose for their leader George Petrovitch, surnamed Kara or the Black. In January, 1806, two numerous Turkish armies, one from Bosnia under Bekir Pasha, and the other under Ibrahim, pasha of Scutari, entered Servia. Kara George had no more than 10,000 men, but they were determined, and knew well the country and the intricacies of its forests. He kept in check both armies, and in the month of August defeated the pasha of Bosnia, and drove him back across the Drina with great loss. He then turned rapidly against the pasha of Scutari, who proposed a truce. But the truce not being ratified by the Porte, George surprised and took Belgrade, except the citadel, which surrendered in 1807. Servia was now free from the Turks. A sort of military government was formed, consisting of the waywodes, or chief proprietors of the various districts, each of whom was at the head of a body of cavalry formed of his tenants and vassals. Mutual jealousies and dissensions soon broke out between the principal waywodes and Kara George, but the latter continued to possess supreme power in the country till 1813, when he was driven into Austria, and died there. Universal discouragement followed; the Turks occupied the whole country, entered Belgrade, and Servia became again a pashalik. The waywode Milosch Obradowitch alone kept up the insurrection about Jagodina; and by a succession of exploits marked by courage and magnanimity he succeeded in obtaining a pasha approved by the people. Belgrade and the other fortresses were to remain in the hands of the Turks, but the Servians retained the administration of the country and their senate, and also the sole right of taxation. Milosch was made Prince of Servia in 1815, and re-ruled, with some modification, the constitution established by Kara George. He ruled with partial success till 1839, when he was forced to abdicate, owing partly, it is said, to Russian influence. He was, however, reinstated, in 1858, and the office he held was made hereditary in his family. He died in 1860, and was succeeded by his son, Prince Michael III., who was assassinated whilst walking in the park near his palace 19th June, 1868. His son, Milan Obradowitch IV., succeeded him in 1872—a regency having been appointed to govern until he came of age. By the treaty of Paris in 1856 Servia was acknowledged as a semi-independent state, and placed under the protection of the three great European powers. Till 1867 Turkish soldiers were permanently stationed in the seven principal fortresses, but in that year the government of the Porte allowed their troops to be replaced by Servian garrisons. To understand more recent events in and around Servia it must be remembered that the inhabitants of Servia and the Serbs round her front on the Bosnians, Herzegovinians, and Montenegrins are scarcely described with propriety as kindred, but more closely as one nation, identical in race, history, and language. They formed in the middle ages one civilized kingdom, and in spite of the illiterate barbarism to which the people had been reduced by their conquerors, the traditions of this kingdom were remembered and sung in heroic song by the poorest cottager. Since 1815, when Servia achieved her independence, her fortunes had been to some extent separated from those of the Bosnians and Herzegovinians, but in 1875 the latter made a vigorous attempt to throw off the Turkish yoke. Its success, however, appeared doubtful, and the Servians, remembering

what the Turkish yoke was, and hoping to bring the fortunes of the day to their brethren, at last entered the arena. They, together with the Montenegrins, declared war in July, 1876, the chief command of the Servian army being assumed by General Tchernayeff, a Russian officer who had already achieved some distinction in Central Asia. He boldly crossed the frontier, but finding himself threatened by superior forces almost immediately retired back into Servian territory. The Turkish government, roused to the imminence of its danger, concentrated large numbers of well-disciplined troops, who, although the Servians were reinforced by numerous Russian volunteers, succeeded in gaining victory after victory until an armistice was proposed, the completion of which was hastened by an ultimatum from Russia. A kind of peace was in course of time patched up between the vanquished Servians and Turkey; but Russia herself declared war against Turkey in May, 1877, and after the fall of Plevna, in the following December, Servia also again declared war, and succeeded in obtaining several victories over the scanty Turkish forces on the frontier. The independence of the country was fully recognized by the treaty of Berlin, and Servia also received the greater part of the basin of the Upper Morava or Sandjak of Nisch. This, however, although a valuable acquisition, was not nearly so much as was transferred to her by the San Stefano treaty between Turkey and Russia. Upon the announcement of the union of the two Bulgarias in 1885 [see BULGARIA], Servia mobilized her army, placed it on the frontiers of Bulgaria, and claimed compensation in Macedonia for the increase in the power of Bulgaria, from whom she also claimed the district of Widin; and she at the same time addressed a note to the Powers, complaining of the violation of her frontiers by robber bands from Bulgaria. Prince Alexander paying no attention to the claim, Servia concentrated her army at Pirot and the Widin frontier in October, 1885. On 14th November, King Milan declared war, and on the same day crossed the Bulgarian frontier and occupied Tim. On the 16th he stormed the Dragoman Pass, after a stout resistance, and drove back the Bulgarians nearly to Sofia; a division also defeated the Bulgarians at Kula, and advanced upon Widin, which was bombarded on the 23rd. Very severe fighting took place between the two armies, in the course of which Prince Alexander and his troops displayed the greatest bravery; and eventually, after a conflict of five days' duration, the Servians were defeated with great loss, and the Dragoman Pass recovered. On the 23rd the Bulgarians advanced in their turn, drove the Servians over the frontier, and on the 26th severely defeated them, and occupied Pirot. An armistice was then granted, upon an intimation that if Prince Alexander advanced further into Servia he would have to deal with Austrian troops. Negotiations took place between the Powers, and peace was ultimately agreed to, on the basis of both powers retaining the territory they possessed before the war.

SERVICE, the name given in English cathedral music to the "Te Deum" and "Jubilate," the "Magnificat" and "Nunc Dimittis," the "Cantate Domino" and "Deus Misereatur," collectively or separately, together with the Gloria, Kyrie, offertory sentences, and Nicene Creed, these being the portions of the English Church service now treated in a special musical manner. The remaining canticles and responses are either chanted or sung to recognized harmonies.

SERVICE TREE (*Pyrus Sorbus*) is a species of tree belonging to the same genus, *PYRUS*, as the apple and pear. It is a tree 20 to 60 feet high, with a large pyramidal head; the leaves are downy on the under surface, and have six or more pair of serrated leaflets with an odd one; the flowers are small, cream-coloured, borne in panicles. The fruit is about the size of a gooseberry, greenish-brown with a reddish tinge; it is acid and austere when ripe, and only fit to be

eaten when commencing to decay, like a medlar. There are two principal varieties of the fruit—the apple-shaped and the pear-shaped. The service tree is a native of France and Italy, and is also found in Northern Africa and Western Asia; it is a rare and doubtful native of England, in which country it is not much cultivated. It is of slow growth, and attains a great age. The wood is very valuable, being the hardest and heaviest of all European timber. It has a compact fine grain and takes a high polish. It is much used for making screws to wine-presses, cogs to wheels, rollers, cylinders, pulleys, mathematical rulers, &c.; for coarser kinds of engravings it is one of the best substitutes for boxwood. The fruit has for long been used to make a fermented drink, as is shown by the name *service*, which is derived from the Lat. *ceresia*, beer.

The Wild Service Tree or Sorb (*Pyrus torminalis*) is a native of England, chiefly of the southern counties, and of Central and Southern Europe. It is a small tree with ovate or cordate lobed leaves. The fruit is much larger than that of the hawthorn, oval and spotted. It is acid but becomes mellowed by keeping, and is brought to market both in England and on the Continent. The wood is hard and tough, and greatly valued.

SERVITOR. See SIZAR.

SERVITUDE. See EASEMENT.

SERVITIUS TULLIUS was the sixth king of Rome, and succeeded Tarquinius Priscus. It stands in the old historians that the mother of Servius was a prisoner from a captured city and a slave to Tanaquil, the king's wife. It was believed that some god was the father of Servius, who was born in a camp, where his mother had shut herself up by the queen's orders. The boy pleased Tanaquil, and all the more as her studies in magical arts seemed to point out a great future for him. He was therefore brought up as her son, though she was not herself childless, and soon made himself deservedly the queen's favourite. As Tarquin grew old he intrusted power, little by little, to Servius, whom he had made his son-in-law, until the latter, at last, held the reins of government entirely in his hands. Tarquin himself had succeeded Ancus Marcius by the popular choice, although that king left two sons. These latter now became violently jealous of Servius, who, they feared, was making himself indispensable to the people and preparing for the succession to Tarquin. They therefore assassinated the latter, hoping to seize the supreme power, but Tanaquil falsely declared the king's wound not mortal, and upon the flight of the sons of Ancus proclaimed Servius regent, as if by the sick monarch's command. When all was once more quiet under Servius Tullius the fact of the king's death was allowed to become known.

It is to Servius Tullius that the Romans attributed their civil institutions, in a similar way to that in which all religious ordinances were fathered upon Numa Pompilius. The great body of non-burgesses (*plebs*) which had grown up in Rome without rights or duties was organized by Servius for the first time. He cut the city of Rome into four districts, and the territory outside the walls into twenty-six; and the whole thirty districts he called *tribes*, on the analogy of the three tribes originally founding the city. Each tribe had its tribune (*tribunus*) or tribe-chief, who managed its affairs and collected the tribute (*tributum*) or tribe-tax. All who lived in the tribe district, patricians and plebeians alike, were numbered with the tribe and had a right to appear in the assembly, called *comitia tributa*. The old assembly of the burgesses or *patres*, the *comitia curiata*, was still held, but its power passed rapidly away. The *comitia tributa*, originally only concerning itself with tribal matters, came to have the power of electing the inferior magistrates of the state in republican times, and eventually to legislative and judicial power, by means of *plebiscita* and *leges* respectively. At the same time Servius divided the citizens, patricians and plebeians alike, into six

military classes, according to their property, each class having its own rank of service and proportion of war-tax or *tributum* to pay. The classes were divided further into centuries or bodies of 100, but of course their number almost immediately became irregular, and the name century was kept on merely for convenience. There were 195 centuries in all, and in voting things were so ordered that if the cavalry (the wealthiest class) and the first class of infantry voted for any measure it was carried *ipso facto*. Thus great power was given to wealth. The *comitia centuriata*, as the assembly of centuries was called, had very great powers. It had to elect all the greater officers of state, to decide on war on the recommendation of the Senate, to sanction the laws passed by the Senate, and to try all the highest offences committed against the state. In each class there were two sorts of centuries, differing by age—the seniors, men over forty-five, and the juniors, men under forty-five. No one was liable to service before seventeen, nor after sixty years of age.

Further, Servius Tullius gave Rome its form as we know it, for he included the Quinque, Viminal, and Esquiline hills with those already in the city, and earned out a plan, originated by Tarquinius Priscus, of surrounding the whole with a stone wall. Parts of the wall of Servius Tullius are still extant. He induced the Latins to join with the Romans in building the great temple of Diana on the Aventine, and thus settled the long-disputed question of the supremacy of Rome over the other Latin communities.

All these wise institutions, with the great increase of strength which they conferred upon the state, brought Servius much popularity with the people at large. But the old burgesses, the patricians, hated him for having lessened their privileges by swamping their votes in the new assemblies. They therefore joined in a conspiracy set on foot by Lucius Tarquinius, son of the late king. Servius Tullius had thought to win the good will of the younger Tarquins by giving them his daughters in marriage. He succeeded with one, Aruns, but failed with the other, Lucius. This monster, by the murder of his wife and his brother, became possessed of his brother's wife, Tullia, whose character was as ambitious and bad as his own; and the pair determined upon the death of the king, now grown quite old. A rumour grew stronger and stronger that Servius intended to abdicate and to found a new government by elected magistrates, like that afterwards actually adopted in the form of consuls. Tarquin felt the time pressed for action, so he assembled the partisans he had gradually drawn round him and denounced the king in the senate house. As Servius hastened to the senate house to denounce the traitor, Tarquin met him on the steps and threw him down there. He was not quite dead, but was soon despatched, and his body lay across the street. His infamous daughter Tullia had hurried to her husband to be the first to salute him king, and was told to return home, as the tumult increased. On her way she came by the body of Servius, which blocked the road, the charioteer would have stopped, but she ordered him fiercely to drive on, and her chariot wheels and her dress were sprinkled with her father's blood. The street was known as the wicked street (*vicus secleratus*) down to the last times of Rome.

The dates given for the reign of Servius, like much of the above story, must be held as merely legendary. He is said to have reigned from 578 to 535 B.C. He was believed to have been born on the nones of the month, but of which month was not known; so for centuries the grateful plebeians, to be quite sure of not omitting to honour his true birthday, celebrated it on the nones of all the twelve months. They held him to be a martyr to their cause. It seems quite certain that he did reorganize the state on a popular basis, and perished in a patrician counter-revolution. As for his slave origin, that is more doubtful. His name being Servius, the well-known habits of **FOLK-ETYMOLOGY**

would be quite sufficient to account for the origin of the tradition.

Although Servius Tullius was a Latin, according to unbroken Roman tradition, and according to the character of his institutions, yet many attempts have been made to show him to be of Etruscan origin, like the Tarquins. The earliest of such attempts we have is a speech of the Emperor Claudius, a great Etruscan scholar, a fragment of which speech is preserved at Lyons. Claudius says the Etruscan name of Servius Tullius was Mastarna. The name occurs in an Etruscan tomb at Vulci, in the Etruscan form *Mestrua*. The evidence on the point, very curious, though largely conjectural, has been of late very thoroughly collected and examined by Professor Gardthausen, a German scholar of Etruscan antiquities, in a little book called "Mastarna or Servius Tullius" (Leipzig, 1882).

SESAMUM is a genus of plants of the order **PEDALICERACEÆ**. The best known species, the Sesame (*Sesamum indicum*), is a native of the Indian region, but has been cultivated in tropical and subtropical countries for ages. It is an annual herb, 2 to 4 feet high, with the lower leaves on long stalks, broad and variously lobed, and the upper leaves opposite and lance-shaped. The flowers are yellowish or pinkish, solitary on short stalks in the axils of the upper leaves. The calyx is five-lobed, the corolla tubular and two-lipped, the stamens four, unequal in length, with the radiated, the anthers four, unequal in length, with the radiated, each containing numerous seeds. The seeds contain an abundance of a fixed oil, sometimes called Gungahy Oil, or Beane Oil, which is employed as an article of diet in Eastern nations, on which account the seeds form a article of commerce from India and Egypt in the present day. The oil is black, tasteless, of a fine quality, and will keep many years without becoming rancid; it is largely used for the same purposes as olive oil. The leaves of the plant abound in a gummy substance, which they readily impart to cold water, making a rich transparent mucus, that is used as a demulcent in disorders of the bowels in children. It is also used, combined with an opiate in dysentery.

SESBANIA is a genus of plants of the order **LEGUMINOSÆ**, so called from the Arabic name of the species indigenous in Egypt. The other species are found in the equinoctial parts of the world, but the most remarkable in India. *Sesbania aculeata*, the Dacca of India, is cultivated in that country for its fibre, which though coarse is of great strength, and valued for fishing nets, &c. It is also found in tropical Africa and the West Indies, and is an erect, slightly branched, pucky annual, with pinnate leaves and racemes of a few large yellow flowers on slender stalks, producing long, narrow, many-seeded pods.

SESOSTRIS, the Greek name of one of the early kings of Egypt, the third king of the twelfth dynasty of Manetho, and according to Herodotus, the successor of Moeris. The exact time of his reign is uncertain, but the most common opinion is that it was about the year 1500 B.C. What has been handed down to us as his history contains such exaggerated accounts of his military exploits, that we must suppose the achievements of several kings, who perhaps bore the same name, to be ascribed to one. So far as Sesostris is historic he is to be identified with RAMESSES the Great.

His reign is represented as a succession of conquests, which began with an expedition into Arabia during the lifetime of his father, and was followed by an expedition into the countries west of Egypt. On coming to the throne he raised an enormous army for the conquest of the whole earth. He subdued the Ethiopians, and sent a fleet down the Red Sea to visit the coasts of India. With his army he penetrated as far as the Ganges, and even to the extreme eastern shores of Asia. He then returned and carried his victorious arms to the Tanais (the Don), leav-

ing memorials and monuments of his conquests. The columns erected in Palestine and two figures of the king cut on the rock of Ionia were seen by Herodotus. After nine years of victory Sesostris returned to Egypt. The rest of his reign was employed in adorning Egypt with monuments and enriching it with useful edifices. After Sesostris had reigned thirty-three, or, according to Manetho, sixty-six years, he was seized with blindness, and put an end to his life.

SESQUI (Lat.), a prefix used in chemistry, and also in music, to denote one and a half (*unus semis-que*, the "unus" having dropped out). It is thus applied to those compound substances in which there is one proportion and a half of oxygen, hydrogen, or chlorine to one of the base, as in sesquicarbonate of ammonia, which contains one and a half proportions of carbon to each one of ammonia.

SESQUIALTERA, an organ stop made up of several ranks of pipes, three, four, or five, which all sound together, giving a chord instead of a single note as each key is pressed. The pipes are quite small, so that they really represent the upper partials of a deep ground tone [see **ACOUTISTICS**], and when the organ is being played with great power and heavy stops, the sesquialtera comes in above with great effect, not being heard as an independent sound, but only telling by brightening the quality of the deep tones into which it melts. The name means "in the ratio of 2 to 3," this being the ratio of the musical interval of the Fifth. All sesquialteras contain this interval, as well as the Third and Octave (that is, the treble or quadruple Octave, of course).

SESSION, COURT OF. See **COURTS**.

SESSIONS, SPECIAL or QUARTER, are meetings held by justices of the peace for a special purpose, by notice specifying the time, place, and object of the meeting. To make valid an order made by a special sessions reasonable notice must be given to each magistrate entitled to be present.

SESTERTIUM, a Roman money of account, not a coin. The sestertium (plural *sestertia*) was equal to 1000 sestertii. In republican times a sestertium was therefore worth about £8 17s. of our money, and in the early times of the empire about £7 16s. 3d. The recognized contraction for sestertium or sestertia was HS, which stood for HIS (i.e. 2500 sestertii), in which the S is for *semis*, a half; *millies* HS, meant 100,000 sestertia.

SESTERTIUS, a Roman coin, which originally consisted of two and a half asses, as the name implies, *sester-tius* being a contraction of *semis tertius*, the third a half, which is the Roman way of expressing two and a half. The sestertius belonged to the brass and also to silver coinage; in both it was of the same value, namely, one-fourth of the denarius. This value agreed with its value in asses so long as the denarius consisted of ten asses. But at an early period the as was reduced in value, and sixteen asses made equal to the denarius, and then the sestertius, its value with reference to the denarius remaining the same, became, of course, equal to four asses. The value of the denarius after the reduction was $8\frac{1}{2}d.$, and therefore the sestertius was worth $2\frac{1}{2}d.$ After the time of Augustus the denarius was reduced to the eighth of an ounce, and was worth $7\frac{1}{2}d.$, and therefore the sestertius was worth $1\frac{3}{4}d.$ The sestertius of the brass coinage was made of finer metal than the as.

The Romans generally reckoned sums of money in sestertii (or in sestertia, their multiples), although the coin used in making payments was commonly the denarius. [See also **SESTERTIUM**.] It need hardly be said that great care must be exercised not to confuse the valuable sestertium with the not very valuable sestertius, the first being a thousandfold larger than the second.

SESTET, a musical composition for six voices or instruments, sometimes written *Sextet* and *Sestetto*.

SESTOS, a town in Thrace, opposite Abydos, in Asia, the Hellespont, less than 7 stadia wide at this point, separating the two. The priestess Hero lived here, and Leander (Leandros) used to swim across to her by night from Abydos, as the famous legend tells. It was at Sestos that Xerxes threw the bridge of boats across the Hellespont by which he crossed into Europe in 480 B.C. The town remained in the power of the Persians for two years, and then fell to Athens.

SETTER is a variety of Dog derived from the large spaniel, so called from its habit of setting or crouching at the scent of game. The setter is a large dog with long silky hair, less smooth than in the pointer, and with much of the waved character of that of the spaniel. The best breeds are those of England and Ireland. The English setter is generally white with large spots or blotches of liver-colour or reddish-brown. The setter is also taught to mark game by pointing like the pointer. Its sense of smell is very acute, and it takes to the water more readily and is better in close covert than the pointer. The setter possesses a high degree of intelligence, and is capable of the strongest attachment—both qualities being exemplified in many well-known anecdotes.

SETTLE, EL'KANAH, owes his immortality to the satire of Dryden and of Pope. Had he not attracted their notice we should probably not now hear of him; but a man to whom we owe the familiar and oft-quoted quatrain in "Absalom and Achitophel" needs some notice, however brief. Under the pseudonym of Doeg, Dryden thus sums him up:—

"Doeg, though without knowing how or why,
Made still a blundering kind of melody,
Spurred boldly on, and dashed through thick and thin,
Through sense and nonsense, never out nor in."

Doeg, that is, Elkanah Settle, was born at Dunstable, in 1618, did fairly well at college, and started as a playwright on coming to London. His tragedy of the "Empress of Morocco" (1673) had great vogue, and the airs the poet gave himself upon this drew down the ire of Dryden upon him. He even attempted to answer "Doeg" with "Absalom Senior," a signal failure. He accepted the office of city poet soon after, and was so unsuccessful in catching the ear of the public in his later life that it is said he was seen at last keeping a player's booth at Bartholomew Fair. He died in the Charterhouse in 1723.

SETTLEMENT. As employed by lawyers the term settlement signifies an instrument whereby the owner of property, real or personal, creates in such property certain limited interests to take effect at some time other than his own death. A settlement differs thus from an ordinary conveyance, by which property is transferred in its entirety from one party to another; and from a will or codicil, whose provisions take effect upon the death of the testator. The intervention of trustees is necessary in settlements of personal, but not in settlements of real estate. A settlement made upon the occasion of a marriage is a marriage settlement. Marriage constitutes a valuable consideration, which gives binding force to a disposition of property made with a view to marriage. The necessity for making marriage settlements has been considerably lessened since the passing of the Married Women's Property Act. See HUSBAND AND WIFE.

SETTLEMENT, ACT OF, is the name applied to the 12 & 13 Will. III., c. 2, which was passed for the purpose of securing the crown of England to the Princess Sophia, electress of Hanover, and granddaughter of James I. At the Revolution in 1688 no further provision was made with respect to the succession to the throne than for the issue of William and Mary and Queen Anne, but it was expressly provided that every person who should be reconciled to, or hold communion with, the see of Rome, should profess the Roman Catholic religion, or should marry a

Roman Catholic, should be excluded from succession to, and be for ever incapable to inherit, possess, or enjoy the crown; and that in such case the people should be absolved from their allegiance, and the crown should descend to such persons, being Protestants, as would have inherited the same, as if the person so reconciled, holding communion, professing, or marrying, were naturally dead. All the descendants of the Stuarts, except the Princess Sophia, were excluded by this stipulation, and on her, therefore, and her heirs, being Protestants and members of the Church of England, was the crown settled, in the event of the expected deaths of King William and Queen Anne without issue. The Princess Sophia, however, died before Queen Anne, and the crown descended to her son and heir, King George I. of Hanover, and from him it has been handed down by right of descent to the present sovereign. The Act of Settlement is the last limitation on the crown which has been made by the English Parliament. It is observable that since the present dynasty wholly depends for its title upon this Act, it exists by virtue of an Act of Parliament; and it need not be pointed out that this undoubted fact is one of immense importance as a perpetual check upon any improper use of the royal prerogative.

SETTLING-DAY is a common arrangement in markets of various kinds, whereby a periodically recurring day is agreed upon for the settlement of business. Especially is this the case with the Stock Exchange and Share Market, whose settling-day occurs twice a month; one settling day being as near as possible to the middle and the other to the end of the month. The Stock Exchange settlement takes in all three days: the first is "contango" or "contango" day, when such business as is not to be settled are carried forward to the next settlement at agreed rates for the privilege; the second is "balance" or "ticket" day, when the buyers' names and amounts to pay for stock are exchanged; and the third is "account" or "pay" day, when differences are settled, and stock may be delivered. The settlement for consols occurs monthly, usually very early in each month, and in the London Stock Exchange the differences are usually settled the day after the "account" day. In many cases where a new capital is issued the committee of the Stock Exchange grants a "special settlement" for the stock, which proceeds on the ordinary lines, but the date of which is fixed by the committee.

SETU BAL or **ST. UBE'S**, a town of Portugal, in the province of Estremadura, 19 miles south-east of Lisbon, on the north side of the bay of its name, which here receives the Sado, forming a very large and deep harbour. The town extends in a delightful valley around the harbour, and is defended by several forts. It has an extensive trade in wine, fruit, salt, and cork. The population is about 15,000.

SEVEN was regarded as a sacred number among most of the nations of antiquity, the cause of which is to be traced to the influence of the seven planets of astrology and star-worship. There were seven degrees in the mysteries of Mithras, seven primitive colours, seven critical days in medicine, seven strings to Apollo's lyre, seven pipes to Pan's flute, and seven gods in the Scandinavian mythology, &c. That seven was also regarded as sacred by the Hebrews is abundantly manifest from their Scriptures. The creation was completed in seven days (Gen. i.). Noah took clean animals into the ark by sevens (Gen. vi. 2, 3), and waited seven days before sending out the dove (Gen. viii. 8-12). The ears of corn and the knee in Pharaoh's dream came up by sevens (Gen. xli.), and there were seven branches on the golden candlestick (Exod. xxv. 37). The blood of propitiation was to be sprinkled seven times (Lev. xvi. 11); seven Sabbaths were to intervene between the offering of the first-fruits and Pentecost; the day of Atonement was the seventh of the tenth month; the Passover

and Feast of Tabernacles each lasted seven days (Lev. xxiii.), and, in fact, the whole circle of festivals was regulated by the number seven. There were seventy Israelites went to Egypt, and the exile lasted seventy years. The number continued to have the same influence among Christians. The Apocalypse is full of it—for stars, angels, churches, lamps, eyes, seals, vials, &c. There are seventy elders. Seven enters into the systems of many of the heresies of the early church. The schoolmen made the cardinal virtues seven, opposite to which were seven deadly sins. And the Catholic Church made seven the number of her sacraments. We ourselves regard seven years or the multiple of seven as almost indispensable in leases other than of ninety-nine years, a custom which probably arose from the superstition of climacteric years, that is, years which are multiples of 7 or 9, the *Grand Climacteric* being 63 (7×9). Even the ninety-nine years' lease relates to a climacteric of the nine series, as is observable. Finally, it was long considered in the middle ages that there were seventy nations and seventy languages on the earth.

The Seven Wonders of the World—the Pyramids of Egypt, the Hanging Gardens at Babylon, the Statue of Zeus at Elis, the Mausoleum, the Colossus of Rhodes, the Pharos of Alexandria, and the Temple of Diana at Ephesus. In medieval times a different seven wonders were famed. These were—the Colosseum at Rome, the Catacombs at Alexandria, the Great Wall of China, Stonehenge, the Leaning Tower at Pisa, the Pinnacle Tower at Nankin, and the Church (or Mosque) of Santa Sophia at Constantinople.

The Seven Champions of Christendom, in the old chivalrous legends, were—St. George of England, St. Denis of France, St. James of Spain, St. Andrew of Scotland, St. David of Wales, St. Patrick of Ireland, and St. Antony of Italy. The romance of their adventures, "The Seven Champions of Christendom," is by Richard Johnson, one of the Elizabethan writers.

The Seven Sages of Greece: these were seven Greek philosophers who flourished about 500 B.C., and were distinguished by their practical sagacity and their admirable principles of life. They were Solon, Chilon, Pittakos, Bias, Peramandros, Kleoboulos, and Thales, and respectively of Athens, Sparta, Mitylene, Priene, Corinth, Lindos, and Miletos. A maxim or adage by each was at a later period inscribed in the temple of Apollo at Delphi. These were: "Know thyself" (Solon); "Consider the end" (Chilon); "Seize time by the forelock" (Pittakos); "Most men are evil" (Bias); "Nothing is impossible" (Peramandros); "Seek the golden mean" (Kleoboulos); "He who hateth surfeit-shap is sure" (Thales).

The Seven Churches of Asia were (1) Ephesus, founded by St. Paul A.D. 57, already ruinous in Justinian's era, 527; (2) Smyrna, yet existing, its first bishop, Polycarp (*Polikarpus*), died 175; (3) Pergamos, famed for its artistic and literary treasures; (4) Thyatira, now known as *Akhisar*, meaning "White Castle"; (5) Sardis, now *Sart*, quite a small village; (6) Philadelphia, now a miserable place called *Aliah Shahr*, "City of God"; (7) Laodicea, now a deserted ruin called *Fikehisar*, "Old Castle."

The Seven Sleepers were seven Christians of Ephesus, who, according to a legend recorded by Gregory of Tours in his "De Gloria Martyrum," when fleeing from persecution in the time of the Emperor Decius (249–51), took refuge in a cave near that city. They were discovered by their pursuers, and the entrance of the cave was walled up. But instead of starving to death, as was expected, they fell into a deep sleep, in which they continued till the reign of Theodosius, when they awoke (447) to find Christianity no longer persecuted, but the accepted religion of the people, and they themselves received in triumph by the Ephesians. Probably this fable arose from a misunderstanding of the phrase "They fell asleep in the Lord," i.e. died.

The Seven Joys of the Virgin are the Annunciation, the Visitation, the Nativity, the Adoration by the Magi, the Presentation in the Temple, the Finding of Jesus among the Doctors, and the Assumption.

The Seven Sorrows of the Virgin (or "Seven Dolours") are Simeon's prophecy, the Flight into Egypt, Jesus missed in Jerusalem, the Benign of the Cross by Jesus, his Crucifixion, the Piercing of his side, and his Burial. The Festival of the Seven Sorrows was instituted by Benedict XIII. in 1725. The world-famed ancient rhymed Latin hymn or SEQUENTIA "Stabat Mater" is used in this festival.

The Seven Archangels are Michael, Gabriel, Lameel, Raphael, Zachariel, Anael, and Oriphiel.

The Seven Heavens of mediæval times were concentric crystal spheres moving round the earth, and presided over by the heavenly body whose name was given to each. The first was the heaven of the Moon, the second of Mercury, the third of Venus, the fourth of the Sun, the fifth of Mars, the sixth of Jupiter, the seventh of Saturn. (Beyond these were an eighth heaven, of the stars; a ninth of swift motion, called the *primum mobile*, which indeed set all the rest in motion; and lastly, a tenth heaven, of eternal rest). In the first heaven, following Dante, we find the spirits of those who, having taken monastic vows, have unwillingly been forced to violate them; in the second are those who rose to virtue through love of fame; in the third are the spirits of lovers; in the fourth dwell the theologians and fathers; in the fifth, the crusaders and martyrs; in the sixth, kings and rulers; in the seventh, the contemplative souls who have passed into one constant meditation on holy things. (The triumph of Christ fills the eighth, the angels the ninth, the visible presence of God the tenth heaven.) These seven heavens are presided over and governed by the following hierarchy of angels:—(1) Angels; (2) archangels; (3) principalities; (4) powers; (5) virtues; (6) dominions; (7) thrones. The Cherubim and Seraphim respectively preside over the external heaven of the stars and the whirling sphere of the *primum mobile*.

The Seven Virtues are prudence, justice, fortitude, and temperance (the four cardinal virtues); faith, hope, and charity (the three theological virtues).

The Seven Deadly Sins are pride, envy, anger, sloth, avarice (with which is often joined prodigality), gluttony, and lust.

The Seven Liberal Arts of the mediæval schools corresponded to the seven heavens, and were grammar, dialectics, rhetoric, arithmetic, music, geometry, astrology. (The eighth study was physics, the ninth morals, the tenth theology). Dante's curious symbolism in the "Convito," where he pursues this relationship through every turn, is most remarkable.

The Seven Heavenly Bodies and their Metals, indissolubly connected in alchemy, heraldry, and scholastic thought, are thus correctly enumerated by Chaucer in the "Prologue to the Yeoman's Tale" ("Canterbury Tales"):

"The bodies seven, eke, lo! hem (them) hear anon:
Sol gold is, and Luna silver we threpe,
Mars yron, Mercurie quykylver we clepe,
Saturnus led, and Jupiter is tyn,
And Venus copér—by my faderkyn."

The Seven Senses often spoken of in country districts ("he skaeared me out o' my seven senses"), are the ordinary five of taste, smell, touch, hearing, and sight, with speech and animation added thereto, evidently in a desperate effort to make up the number of the heavenly bodies, each of which was the protector of one of the senses, in the view of the half-awakened intellects of the dark ages.

The Seven Colours of the rainbow were red, orange, yellow, green, blue, indigo, and violet; but modern science prefers to divide colour into three primary lights, red, green, and blue, whence all other luminous colours are derived, and into three primary pigments, red, yellow, and

blue, whose combinations are sufficient to give all hues and varieties of reflected colours.

SEVEN DIALS, a district in London in the parish of St. Giles, formerly notorious for its squalor, crime, and vice, was so named from its central spot, an open space whereon seven streets converged. In the midst was a raised inclosure guarding a short seven-sided pillar, each face of which bore a dial. Thus Gay in his "Trivia" (ii.),

"Where famed St. Giles's ancient limits spread,
An inrailed column rears its lofty head;
Here to seven streets seven dials count the day,
And from each other catch the circling ray."

The passage of a main thoroughfare through the heart of this district has effectually banished its former horrors, but it is even now somewhat of a disgrace to the first city of the world.

SEVEN LAST WORDS, THE, is the title of a service in the Roman Catholic Church, when the priest recites the seven last phrases recorded to have been spoken by Jesus, and upon each "word" delivers a short homily. Between the "words" music appropriate to the occasion is played, and the whole service takes place on Good Friday, or sometimes during all Passion week. Haydn has composed seven magnificent adagios for the intermezzi of this impressive service; and afterwards these were arranged in four-part harmony, and words were fitted to them, so that a sort of sacred cantata was produced, which became a very favourite composition apart from the service above described.

The seven words are these:—"Pater, dimitte illis; non enim sciunt quid faciunt" (Father, forgive them, for they know not what they do, Luke xxiii. 34); "Amen, dico tibi, hodie mecum eris in paradiso" (Verily I say unto thee, to-day shalt thou be with me in paradise, Luke xxiii. 43); "Mulier ecce filius tuus, et tu ecce mater tua" (He saith unto his mother, Woman, behold thy son: then saith he to the disciple, Behold thy mother, John xix. 26, 27); "Sitio" (I thirst, John xix. 28); "Deus meus, Deus meus, ut quid dereliquisti me?" (My God, my God, why hast thou forsaken me? Matt. xxvii. 46); "Consummatum est" (It is finished, John xix. 30); "Pater, in manus tuas commendo spiritum meum" (Father, into thy hands I commend my spirit, Luke xxiii. 46).

SEVEN WEEKS' WAR, a title often bestowed upon the short and sharp struggle for the supremacy of Germany which deposed Austria and elevated Prussia to the coveted post of honour. The immediate cause of quarrel was the Schleswig-Holstein occupation. It was fought in the spring of 1866, and practically ended with the crushing defeat of the Austrians at Sadowa (or Königgrätz), 3rd July. Austria eventually gave up Venetia and the Quadrilateral to Italy (which had cast in its lot with Prussia, but had been completely beaten on all hands by the southern army of Austria), but saved her honour by nominally giving them to France, which latter country at once transferred them to Italy, and the existence of Italy as a united kingdom began. War was declared on 17th June, and the Prussians entered Bohemia on the 24th. The concluding treaty of Prague between Prussia and Austria was not signed till 23rd August, but the war had really ceased long before. The treaty of Vienna between Austria and Italy was delayed even later, and was not signed till 3rd October. The Quadrilateral was evacuated 9th October.

SEVEN WISE MASTERS, BOOK OF THE, a collection of mediæval tales of very wide popularity in its day. The groundwork of the collection is the story of a young prince who discovers by astrology that if he says one word during the next seven days he will surely perish. At the same time he is in mortal peril if he does not defend himself, for his father's young wife has tempted him vainly, and on his refusal has accused him falsely so that she may be avenged for the humiliation he has caused her to suffer.

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Every day she attacks the father of the prince with a tale calculated to inflame his wrath. but every day one of the seven wise men, friends of the prince, rebuts it with a counter narrative, and succeeds in turning the mind of the angry king to merciful thoughts. In the end, the prince's tongue being free, a few words from him sets the whole matter clear, and justice is done. The collection is often known as "Sandhabar's Parables." It is very ancient, and is found in Arabic in the earliest known form, but it is admittedly a translation from Indian sources of the tenth century. In the twelfth century it was translated into Hebrew and Greek, and into Latin in the thirteenth. It became highly popular in Europe. Soon after we meet with French, then English, and lastly German translations.

SEVEN YEARS' WAR, a contest between Prussia and Austria, and their respective allies, for the possession of Silesia. It broke out in August, 1756, and was distinguished by the great battles of Prague (6th May, 1757, in which the Prussians were successful); of Kolin (18th June, an Austrian victory); of Rossbach (5th November, a severe Austrian defeat); Lenthén (5th December, also disastrous to the Austrians); Zorndorf (25th August, 1758, Russians defeated by Frederick the Great); Hochkirch, (11th October, Frederick repulsed by the Austrians under Daun); Minden (1st August, 1759, the French defeated by Prussians and British); Kunersdorf (12th August, a terrible blow to the Prussian forces, which were overthrown by the Russians and Austrians); Torgau (3rd November, 1760, defeat of the Austrians); and Reichenbach (19th August, 1762, a great Prussian victory). The peace of Hubertsburg, 15th February, 1763, left Frederick in possession of Silesia, and greatly increased the prestige and influence of Prussia. The British were the principal allies of the latter power; the French and Russians of Austria. (See Carlyle's "History of Frederick the Great," and Macaulay's "Essays.")

SEVENOAKS, a market-town of England, in the county of Kent, pleasantly situated on the northern slope of the North Downs, near the upper course of the Darent, 26 miles from London by the London, Chatham, and Dover Railway, and 20 by the South eastern. The town is well built, and contains many good houses. The church is of Perpendicular architecture, spacious and elegant; and there is a well-endowed grammar-school. Besides a Congregational chapel, there are Wesleyan Methodist and Particular Baptist chapels, a literary institution, town-hall, bank, good hotels, and a police station. The town has greatly extended in recent years. The surrounding district is very fertile. In the neighbourhood is Knole House, a splendid manorial mansion in the Tudor style. It contains a good picture gallery, and some choice relics of antiquity. The park is of great extent, and includes some beautiful scenery. Knole was anciently the residence of the Sackville family. The population of the parish in 1881 was 6296.

SEVENTH, in music, is one of the sharpest dissonances, sharing that honour with the Second. The major Seventh and the minor Second are the harshest chords in music; consequently when properly led up to and resolved they give great colour and force to the harmony. The minor Seventh is very important in its main form as part of the full dominant harmony, fixing the key as no other interval can do, especially when the Third of the dominant, which is the Seventh of the scale, is added to it. The chord of the diminished Seventh, made up entirely of minor Thirds, is a very valuable chord in music, as by a change of nomenclature (the sounds themselves remaining unaltered) it can be held to form part of several different keys; and thus when led up to in one key, can lead off into quite another key.

A chord of the Seventh may be taken on any note of the scale but the Fourth and Seventh; and such chords

have the Third and Fifth as well as the Seventh to their base. They are called diatonic Sevenths, and always resolve on a chord whose root is a Fourth above their base. Diatonic Sevenths may usually be regarded also as the first inversions of diatonic Ninths, which gives them, by the same rule, a second resolution, on to a chord whose root is a Second above their base.

The Sevenths which are fundamental discords are, however, the most usual and the most striking Sevenths. They may be taken without preparation, while the diatonic Sevenths may not; but their most usual resolutions are upon the chords whose root is a Fourth above their own, as with diatonic discords. The chief fundamental Seventh is the dominant Seventh, already alluded to, which has a major Third, a perfect Fifth, and a minor Seventh; and the others are chords with exactly the same intervals taken upon the tonic and the supertonic respectively. The tonic Seventh must be followed by either a dominant or a supertonic discord to prevent modulation into another key, and the supertonic Seventh must be followed either by tonic or dominant harmony for the same reason.

SEVERINUS was the name of a pope who reigned for a few months only, in succession to Honorius I., in 610.

SEVERN and **WYE**. The Severn is the finest, and, next to the Thames, the largest and most important of British rivers. The Wye is its chief tributary.

The Severn rises on the western border of Montgomeryshire, from a chalybeate spring on the eastern side of Plinlimmon, at a very considerable elevation. It flows eastward about 12 miles to Ludlow, as far as which place it still retains the original British name of *Hafren*. After flowing N.N.E. about 51 miles by Newtown and Welshpool, it quits Montgomeryshire and enters Shropshire, flowing east to Shrewsbury, and then south-east to Coalbrook Dale and Bridgenorth. It enters Worcestershire near Bewdley, and flows nearly south past Stourport, Worcester, Upton, and Tewkesbury, where it enters Gloucestershire, and flowing nearly S.S.W. to Gloucester, it branches into the two channels which inclose Almy Island, and thence past Newnham to Bristol, where it receives the Lower Avon, and enters the Bristol Channel by a wide estuary. The Severn receives the whole of the waters of the interior of Shropshire, and its course through that county is between 60 and 70 miles. Its total length, from its source in Montgomeryshire to the Bristol Channel, is about 210 miles, and it drains a basin of 6000 square miles.

In respect to navigation, the Severn has long been of very great importance. It supplies the means of transporting the produce of mines and manufactories of various descriptions lying in the vicinity of the river to the sea, to North Wales, and to the towns and remote districts of the counties through which it flows. It is an extremely important commercial river to Shrewsbury, Worcester, Gloucester, and Bristol. It is navigable to Welshpool, 178 miles, and deep enough for barges as far as Stourport. The tide ascends to Digne, near Worcester, 120 miles, or 40 miles beyond the estuary. The upward navigation is difficult, and from Gloucester to the estuary, 18 miles in length, admitting vessels of 350 tons, the river being navigable for those of 140 tons only. Other emblems connect it with the Mersey, Trent, and Thames. In Shropshire the river is navigable for vessels of 30 to 40 tons. Owing to the peculiar form of the Bristol Channel, and its opening towards the direction in which the tide-wave advances, the estuary and river mouth are subject to a *Bore* or *cogre*, which sometimes advances with a height of 9 feet. The spring tides range from 30 to 48 feet; at Chepstow the rise is often 60 feet, the greatest in any part of Europe.

The Wye has its rise on the border of Montgomeryshire, and on the mountain of Plinlimmon, about 2 miles south-west from the source of the Severn. It flows S.S.E.

past Rhayader and Builth. Near Talgarth it turns east by north and flows past Hay, and then east by south to Hereford, whence it flows nearly south past Ross, Monmouth, and Chepstow, where the river is crossed by a massive iron bridge, and about 2½ miles south-west of that town it falls into the estuary of the Severn. Its whole course is very beautiful. It is navigable for barges up to Hereford. At Brook's Weir, between Redbrook and Tintern, the stream is met by the tide, and this place is accessible to vessels of 90 tons. The length of its course is about 130 miles. Owing to the isthmus or neck of land above the mouth of the Wye, and the projection of Aust Cliff on the opposite shore, the width of the Severn is here only one mile, while higher up it expands to between 2 and 3 miles.

The Severn is charged with a larger relative amount of turbid sediment than any other river in Europe, the result of its own long course and of those of its tributaries through tracts of marl and soft sandstone. This fine sediment is in some places deposited on its banks towards the mouth, and the quantity thus deposited is increased by artificial means. The mud is encouraged to accumulate upon lines of piles and osier, which, as the tide retreats, retain the sediment. Upon these other lines of osier fencing are placed, until the new land is raised to a considerable height.

SEVERUS, FLAVIUS VALERIUS, Roman emperor, was Caesar under the Emperor Galerius in 305, and assumed the purple on the death of Constantine Chlorus in Britain, 306. He advanced against Maxentius, who had proclaimed himself emperor at Rome, was taken prisoner at Ravenna, and forced to commit suicide at Rome, 307.

SEVERUS, MARCUS AURELIUS ALEXANDER (usually called *Alexander Severus*), Emperor of Rome, the son of Julia Mamaea, was born in Phoenicia, in 208, and at an early age was brought to Rome. His name of Alexander commemorated his birth in the temple of Alexander the Great; his own name was really Alex-
asius Bassianus. He changed his name to mark an alleged descent from the second Antonines. When Elagabalus became emperor he adopted Alexander Severus; and on the death of Elagabalus Severus was made emperor, in 218. He reigned well, and had some success against the Persians. In the course of a mutiny among his troops, instigated by Maximin who succeeded him, both Alexander and his mother were killed, in Gaul, in 235. The murder of Alexander Severus and the elevation of the illiterate savage barbarian Maximin to the throne, by the mere favour of the soldiery, mark a point in the downfall of Rome. True that no emperor had ever been succeeded by son and grandson, and not many indeed by a son, but at least the emperors had been well-born, and many of them trained to statesmanship. After this event the meanest peasant might hope to rise to the mastership of the world by military prestige.

SEVERUS, L. SEPTIMIUS, was a native of Leptis in Africa, where he was born, 11th April, 146. After his eighteenth year he went to Rome, where he studied with Papinian and received a fiscal office, from which he was promoted by Commodus to that of legatus of the Provincia at Lyons. He was at the head of the army in Germany, when, on the news of the accession of Didius Julianus, the army proclaimed him emperor, and on entering Rome he was acknowledged as such (193). His first work as emperor was to break down the power of Pescennius Niger, whom the army of the east had saluted emperor. He defeated his rival at Issus, took him prisoner, and put him to death (194). Nearly two years more were spent before the capture of Byzantium could be accomplished, and its prolonged resistance so enraged Severus that he treated it with barbarous severity when it fell into his hands. In 196 he returned to Italy, but almost at once was called to Gaul to meet Albinus, proclaimed emperor by the Gallic legions, and whom he overcame and slew at Lyons in 197. A short sojourn at Rome was terminated by the necessity

again to proceed against the Parthians. These obstinate foes were subdued for the time in a brilliant campaign, during which Seleukeia and Babylon were occupied, and Arabia, Palestine, and Egypt brought into stricter order under the eye of the emperor.

He now returned to Rome (202); but the reputation for good government and liberal opinions which he had won during his long struggle for supremacy did not long adorn his reign. He rapidly developed into an arbitrary tyrant when once his throne was made secure by the fall of Albinus; though whether this was his true character or that

species of madness which so frequently attacks the possessors of despotic power, as Tacitus was perhaps the first historian to point out, cannot now be determined. The reign of Severus makes a definite breach with the semi-republican imperial constitution of the Cæsars. This emperor was the first to treat the Senate as his mere council, and to break down the carefully observed distinction between the servants of the Senate (*i.e.* of the state) and the servants of the emperor (*i.e.* of the court). He thus prepared the way for the undisguised military tyranny of Diocletian. As if the better to mark his own views he placed



Wall of Severus, on lines of Hadrian's Rampart, Northumberland.

the official "deification" of the brutal tyrant Commodus, whom he succeeded, and this, too, after having roundly abused his character in the first days of his reign.

In 208 Severus set out on a British expedition. Geta, one of his sons, was left with an army in South Britain, while the emperor and his other son, Caracalla, marched north. He attempted to secure the limits of his conquest by constructing the great fortifications along the lines of Hadrian's earlier rampart, known as the Wall of Severus, which extended from the Solway Frith to the mouth of the Tyne. He died at York in 211. His triumphal arch at Rome, forming one of the entrances to the forum, still remains in very fair preservation.

SÉVIGNÉ, MARIE DE RABUTIN-CHANTAL, MARQUISE DE, by universal consent the greatest letter-writer who ever lived, would have been a remarkable person even if she had not, through a fanatical passion for her daughter, been driven to indite the priceless correspondence we all enjoy. She was born in the year 1626 at Paris, and was the granddaughter of that eminently pious person, Madame de Chantal, generally known as Sainte Chantal. It is to this lady that many of his celebrated letters of spiritual advice are addressed by Saint Francis de Sales. When these two devout people met Sainte Chantal recognized Saint Francis as a holy person "who had been revealed to her in a dream not long before," and Saint Francis, possibly out of compliment to the lady, for he was a most honourable and courteous father confessor, "immediately remembered a vision which he had seen of Madame de Chantal at the Château de

Sales in Savoy.' It is not surprising, then, that soon after Madame de Chantal permitted her religious propensities to predominate over her maternal duties. Her son, the young Baron de Chantal, grew up handsome, reckless, accomplished, and devout. In 1624 he married Marie de Coulanges, and two years later was born their second and only surviving child, Marie de Rabutin-Chantal, better known by her aftername of Marquise de Sévigné. This poor little child very soon lost both her parents, the baron being killed in 1627 at the Island of Ré and her mother dying of grief shortly afterwards. Recourse was naturally had to the grandmother, the Sainte Chantal, but so absorbed was that holy lady in founding fresh convents that, except for one or two letters, all admirably expressed, she does not seem to have taken much interest in the fate of her little granddaughter. The child was consigned to the guardianship of the excellent Abbé de Coulanges, her uncle, whose goodness to his charge earned for him her pet-name of Le Bienbon. This arrangement was contrary to the wishes of Baron Bussy-Rabutin, who had used his influence to place his young cousin in a convent.

Marie grew up to be a great beauty, and as clever and devout as she was lovely. But, a most remarkable thing at that age, she was learned without being the least of blue-stocking, and pious without losing her wit and her almost reckless love of fun. At the age of eighteen, out of the numerous applicants for her hand, the Marquis de Sévigné, of good Breton family, was chosen. But, unhappily for the pure and talented girl he married, he soon showed

himself the mere reflection of the time, selfish, unprincipled, and vicious. He wasted his own fortune and much of his wife's with Ninon de l'Enclos and such ladies, regardless of the treasure he left neglected at his own fireside. Madame de Sévigné seems to have tried to love her dissipated husband, and never uttered a word of him otherwise than in the language of affection; but it is easy to see by the lover-like passion with which she adored her daughter that her devotion had been repulsed too often, and had finally changed its object. The marquis fell in a duel over one of his "flames" (Madame de Gondran, usually styled *la belle Lolo*), in 1651, leaving Madame de Sévigné in the full splendour of her beauty, still only twenty-five, and a pure ornament of a vicious court. She had two children, Charles and Françoise Marguerite, and at first devoted herself entirely to their education; but when after a year or so she appeared again at court, she kept up her great reputation for wit and brilliant conversation without ever encountering even the breath of scandal. In 1669 she married her daughter to M. le Comte de Guignan, governor of Provence, a gentleman of considerable power and wealth, but quite middle-aged. He was a good husband, but the maternal solicitude of Madame de Sévigné was not satisfied without an interchange of news by every post between her and her daughter.

Madame de Guignan does not appear to have altogether reciprocated the loving sentiments of her mother. Perhaps she became wearied, like a spoiled child, with her mother's demonstrations of affection. That lady's letters really teem with worldly wisdom, high-toned morality, and shrewd observations. There are outbursts of genuine maternal love, and delightful lingerings over scenes past and gone. Mingled with these are vivid descriptions of the way in which Maréchal de Grummont was entrapped by the king into giving a candid opinion of some verses his Majesty had written; of the suicide of Vatel, the general of all the cooks employed during a grand *fête* at Chantilly; of the queen's interview with Sister Louise de la Miséricorde (Mademoiselle de la Vallière); of the death of Luemere; of the engagement of la Grande Mademoiselle; of the oppressive taxation levied to meet the enormous expenses of Louis XIV.'s wars and other extravagances—all told with that art which has never been equalled in the epistolary style. The number of these famous letters, whose stream was only broken during brief visits of mother to child or child to mother, is very great, and many of the letters are long. They fill 3000 pages of very close print, consequently they are better known by selections than in their entirety, except among a few speed students. But taken together they form not only a self-revelation of a most interesting mind, but a historical picture whose value and accuracy it would be hard to overestimate. The very coolness with which the sufferings of the prisoner-marchioness De Brinvilliers are recounted, and similar things are not infrequent in the letters though sometimes quoted to Madame de Sévigné's discredit: is really but a sign of the times. The writer seems so far above her epoch that we are surprised when in such touches we find she unconsciously suffers from its stain.

Madame de Sévigné caught the small-pox during a stay at Guignan, and died there in 1696. Her daughter is said to have fled for fear of infection. Years afterwards she herself fell a victim to the same dread scourge from which she had escaped for the time at the sacrifice of her filial love and duty.

The most elaborate biography is the fine work of Walckenaer (five vols., Paris, 1856). The best edition of the letters is that by Monmerqué, in fourteen volumes (Paris, 1861-66). An excellent brief account of the life and writings of Madame de Sévigné was produced by Mrs. Richmond Kitchie (Miss Thackeray) in 1882.

SEVILLE, the capital of Andalusia and of the province of its own name, in Spain, is situated in a plain on the banks of the Guadalquivir, at a distance of 22 miles S.S.W. from Madrid, on the railway to Cadiz, from which port it is distant 62 miles. It has about 150,000 inhabitants. The city is supposed to be of Phœnician or Carthaginian origin; its Phœnician name was *Spali* or *Sephala*, which is said to mean a plain. Of this word the Romans and Greeks made *Ispalis* or *Hispalis*; the Arabs *Ishbilia*, and modern Spaniards *Sevilla*. Under the Romans it became one of their colonies, and was called *Colonia Julia Romula*. In 712 Seville opened its gates to the Arabs, who made it the seat of their empire, until the foundation of the Western Caliphate at Cordova in 756. From this period Seville continued to be the second Moorish city in Spain until the year 1031, when, on the overthrow of the Umayyad caliphs of Cordova, it became the capital of a separate kingdom. On 23rd November, 1218, the city was taken, after a fifteen months' siege, by Ferdinand, king of Castile; and from thence until the time of Philip V. it was the principal residence of the Spanish monarchs. The French took it in 1810, and again in 1823.

The city is almost circular, and is about 6 miles round. It is surrounded by walls partly of Roman, partly of Moorish construction, flanked by sixty-six (formerly 166) old towers, and pierced by fifteen gates, outside of which are several suburbs. One of the suburbs is called the Triana, and is chiefly occupied by gypsies and persons of the lowest class. It was in this place that the founders of the Inquisition held their first tribunal in 1481, and on the adjoining plain the "burning place" is still pointed out. The streets of Seville are crooked, ill paved, and exceedingly narrow, but year by year alterations are being carried out and wider thoroughfares made. The city contains several fine squares. The houses are, perhaps, the most picturesque in the world. They have generally a large paved court, ornamented with running fountains, flowers, &c., and surrounded by marble columns supporting galleries or rooms above. In the summer a canvas awning is thrown over the whole court during the heat of the day, and removed at night, and there the family usually sit to receive their visitors. The public walks are much admired, and are superior to anything else of the kind in Spain. The importance of the city in popular esteem appears from the proverb, "*Quien no ha visto Sevilla no ha visto maravilla*"—(He who has not seen Seville has not seen a wonder).

Seville contains many remarkable buildings—La Torre del Oro, in which the gold brought from America used to be deposited; La Lonja (exchange), a magnificent structure erected by Philip II. in 1523, over which are the archives of the colonies; the Casa-de-Pilatos, or palace belonging to the dukes of Alcalá, which is said to have been built on the exact model of that of the Roman governor of Jerusalem; the town-hall, the naval college of San Telmo, the cannon foundry, the tobacco factory, and the famous aqueduct, built or repaired by the Moors.

The cathedral, the largest and finest in Spain, was founded in the year 1401, on the site of the ancient mosque, but was not completed until 1519. Externally it presents a mixture of Arabian, Gothic, and Greco-Roman architecture; but its general appearance is very imposing. The interior, which is exclusively Gothic, is rich and grand. Its dimensions are 398 feet by 291. Four rows of enormous clustered columns, eight in each row, separate the aisles. The roof of the centre nave and transept is 184 feet above the pavement; at the transept dome the height is 145 feet; and the roof of the side aisles is 96 feet high. The centre aisle contains the choir and the grand altar. Above the choir, which is separated from the body of the church by a lofty and richly worked screen, is the organ, which contains 5300 pipes and 110 stops. The high altar is ornamented

with the richest marbles, paintings by Murillo and other great artists, statues, and a profusion of gilding. The chapels, in all about twenty-six, contain many treasures of art, paintings, statues, and exquisite carvings, by the best masters of the Sevillian school. Behind the high altar is the Capilla Real, which contains the tomb of Ferdinand III. The Giralda, a lofty square tower of Arabian architecture, which originally formed part of the ancient mosque, serves now as a belfry to the cathedral. It was built in 1160, and was at first only 250 feet high; but in 1568 it was raised 100 feet. On the top was placed a statue of Faith, of gilt bronze, which, though 14 feet high, and of the enormous weight of 3600 lbs., turns (*gira*) on a pivot and acts as a weathercock, thus giving the name Giralda to the tower. This tower and the court of the orange-trees are the only remains of the ancient Moorish mosque. Attached to the cathedral is a very valuable library, founded by Columbus, who was buried here. On his tomb is the inscription:—"A Castilla y Arragon otro mundo dio Colon" (To Castile and Arragon Columbus gave another world). The body, after resting thirty years, was removed to St. Domingo; and on the negroes obtaining possession of that town in 1795, it was transferred to the Havannah. Seville has many parish churches, and a great number of convents. That of La Merced, founded by Ferdinand in 1249, is one of the most remarkable for its size and architecture. The hospitals of La Sangre and La Caridad are very fine buildings. But the edifice which, after the cathedral, most attracts the attention of travellers is the Alcazar, or Moorish royal palace, which in some respects rivals the Alhambra, and though modernized, still preserves much of its original beauty, especially the Hall of the Ambassadors. The gardens which surround the palace are very beautiful. There is also a palace belonging to the Duc de Montpensier. Outside the walls is the Plaza de los Toros, or circus for bull fights, half wood and half stone, capable of accommodating 14,000 spectators.

Seville is the see of an archbishop. It has a university, founded in 1502; an academy of painting, sculpture, and architecture, and several literary and scientific establishments. The trade, which has greatly declined since Spain lost her American colonies, is chiefly in oil, wine, corn, hemp, flax, liquorice, lemons, and oranges. There are iron and machine works; royal foundries and factories for the manufacture of arms, fitted up with machinery imported from England; porcelain works, and establishments for weaving and soap-making. The government factory for making tobacco and cigars is the largest in Europe. Steamers ply regularly between Seville and Cadiz. Small vessels can come up to the town.

Seville is peculiarly the home of Spanish art; the greatest of her painters, Murillo and Velasquez, were born there, and Zurbaran painted his best pieces to adorn her walls. Her writers are scarcely less noted. The most celebrated novelist of modern Spain, Cecilia Bohl de Faber (Fernan Caballero), had her home there. There Amador de los Rios composed his chief works. The Bequeers—both the painter and the novelist—were born there.

SEVRES, a town of France, in the department of Seine-et-Oise, 5 miles east by north from Versailles, on the railway to Paris, is situated at the foot of a high hill on the left bank of the Seine, over which there is a handsome stone bridge. Its population in 1881 was 6834. The town is famous all over Europe for its great national porcelain manufactory, founded in the reign of Louis XIV. An account of this renowned factory will be found in the article **CERAMIC ART**, and some specimens of Sèvres porcelain are given in the Plates illustrating that article. Until the war of 1870, when it was destroyed, it possessed a curious museum, in which were arranged specimens of all foreign and French porcelains, and of the clays and other ingredients which enter into their composition, to-

gether with a collection of models of the vases, ornaments, services, figures, and statues that have ever been manufactured in the town.

In 1876 a new manufactory was established with two museums, one for the works of Sèvres, and the other for foreign work of all ages. The old quarries in the hill behind Sèvres have been formed into vast cellars, which are said to impart a peculiar quality to wine. Coloured and enamelled pottery and glass are also made here. The town is well built, and has a very ancient church.

SEVRES, DEUX, a department in France, formed out of Upper Poitou, and named from its two chief rivers, is bounded N. by Maine-et-Loire, E. by the department of Vienne, S. by those of Charente and Charente-Inférieure, and W. by Vendée. Its greatest length is 79 miles, its greatest breadth 42 miles. The area is 2317 square miles, and the population in 1881 was 350,103.

General Aspect.—A chain of low granite hills, which form the continuation of the Limousin Mountains and nowhere exceed 110 feet in height, crosses the department from south-east to north-west, dividing it into two slopes, of which the northern belongs to the basin of the Loire, while the southern one forms part of the independent basin of the Sèvre-Niortaise, but comprises also a portion of the basin of the Charente. From the source of the Sèvre-Niortaise this range forms a broad and in many parts bare and rocky table-land, called Gâtine, with a poor wet soil, which covers two-thirds of the surface of the department. The east of the department presents numerous valleys, shut in by lateral branches from the main range, and opening into the valley of the Thouet, a feeder of the Loire. There are plains of considerable extent in the south-west of the department. In the plains and valleys of the south-west of the department the soil is excellent, but farming is in a backward state.

Hydrography.—The south-west of the department is drained by the Sèvre-Niortaise, which rises a little north of the town of Melle, runs in a general western direction past Niort, separating in its lower course the departments of Vendée and Charente-Inférieure, and falls into the Atlantic opposite to the Isle of Ré. Its total length is about 65 miles. The Sèvre-Nantaise rises in and drains the north of the department, flows through the north-east of Vendée, and after a course of about 70 miles enters the Loire opposite the city of Nantes, in Loire-Inférieure. There are many other smaller rivers and several canals. The line of railway from Paris to Rochelle crosses the department.

The climate in the plains is warm and genial; in the Gâtine the winters are longer and colder than those of Paris, and in summer thick fogs are very frequent.

Products and Resources.—The agricultural products include the common cereal grains, with buckwheat, maize, millet, mustard, pulse, clover seed, almonds, chestnuts, hops, hemp, and fruits. The vineyards are chiefly in the south, but there are a few also in the neighbourhood of Thouars; the greater part of the wine they yield is made into brandy and vinegar. Large numbers of cattle and horses are bred, and the department is famous for its mules and asses, in which the trade is considerable.

Iron exists at various points, and there is coal on the confines of Vendée. Antimony, flesh-coloured marble, building stone, granite, quartz, millstone grit, flint, and mail are also obtained. Chalcedony is found in the neighbourhood of Niort, and fossils abound in the calcareous strata that skirt the western side of the granite rocks of the Gâtine. The principal manufacture is that of gloves and shoe-leather, which is carried on in the environs of NIORT, the capital, whence shoes are exported in considerable quantities.

The department is divided into the four *arrondissements* of Niort, Bressuire, Melle, and Parthenay.

SEWEL'LEL (*Haplodon leporina*) is a remarkable North American rodent, the only species of the family Haplodontidae. The sewellel is about a foot long, with a short thick heavy body, very short much flattened tail, rounded hairy ears, very small eyes, and strong stiff whiskers. The limbs are short and robust, and the feet are furnished with five claws, which, especially on the fore feet, are powerful and well adapted for digging. The skull is very flat, very wide behind, and has large bony orbits; there are no post orbital processes. The molar teeth are five above and four below on each side, rootless, simple, and prismatic. The body is covered with a dense soft fur, reddish-brown above and grayish on the under surface. The sewellel inhabits the Washington and Oregon territories, extending into California. It lives near the coast of small societies, inhabiting burrows and feeding on roots and berries. They are trapped by the natives, who esteem them highly as food, and make cloaks and blankets of their skins.

SEWERS and SEWAGE. The necessity of underground channels for the purpose of carrying off the surface waters and liquid refuse matters from houses in the highly populated places, was well understood by the ancient Romans, who at a very early period adopted a regular system of draining in their famous sewers. [See CLOACÆ.] These included not merely the spacious subterranean vaults by which the drainage of the pestiferous marles near the city was effected, but also the wooden pipes, clay tubes, or conduits of whatever kind by which the excrements were conveyed from the houses to the main conduits. An elaborate system of sewerage has been discovered in connection with the Colosseum. So completely was the city materialized, that the passages that it was designated by Pliny as *urbs* were, as a city supported upon arches. The *arsakara* (artificial) canal for the ancient Hindus was beyond doubt connected with drains and receptacles for its accumulations. The great canal system of Egypt, executed under Rameses I. and his successors, served extensive sewerage purposes; and probably also the magnificent canals of Assyria and Babylon, fed by the Tigris and Euphrates. The discoveries among the ruins of Jerusalem have shown that the ancient city contained a complex and perfect system of aqueducts, drains and reservoirs. The preservation of many of the aqueducts is owing to the fact that they were excavated in the solid rock, and have not been destroyed by the demolition of the structures above. It appears that the pool of Solomon received the washings of the temple, and the liquid was used for the purpose of irrigating the fertile gardens. The discovery clearly shows that the inhabitants of Jerusalem were fully aware of the necessity of speedily removing all decomposable refuse matter.

The system of sewerage of Paris has during the last century been made very complete. To organize it the city was divided into five basins, of which three are on the right and two on the left bank of the Seine. Six principal galleries cut the city at right angles and receive fifteen smaller galleries, and these in turn numerous minor galleries. In many of the galleries there are tramways, on which cars are run in cleaning the sewers, and also for carrying visitors. The water and gas mains are also carried in the galleries covering the principal sewers.

In England sewer commissioners were appointed in the reign of Henry VI., but their powers were restricted to surface drainage and sea walls, the subject of municipal sewerage being left principally to local commissions, and in some of the cities to corporations empowered by special Acts of Parliament. The drainage of London was provided for by legislative enactments commencing in 1225, and the whole subject was thoroughly revised by Sir Thomas Moore in the celebrated Bill of Sewers, passed in 1531. The use of the sewers of London, even up to the present

century, was limited to the removal of the waters that ran in the gutters of the streets, including those thrown out from the houses; and in the reign of George III. an Act was passed prohibiting the discharge of other matters into them under penalty of a fine. Every house was provided with a cess-pool, and this was occasionally discharged by the night carts, which conveyed away the offensive matters. Upon the gravelly soil to which the city was then limited this answered very well; but its extension over the more impervious clay beds, and the introduction of abundant supplies of water into every house, followed by the invention of water-closets, led to a new use of the sewers, and to various results not at all contemplated in their original construction. The refuse matters of the cesspools, instead of being transported into the country to serve as manure, were turned into the river Thames, polluting its waters, while the sewers themselves in the lower parts of the city were incompetent to discharge the increased burdens, and the ventilating flues through the streets became avenues of the most poisonous gases. All this has been remedied (as described in the article DRAINAGE, METROPOLITAN MANS), and London is now certainly the best-drained city in the world, and its sewers are unrivalled for extent and excellence of construction.

DISPOSAL OF SEWAGE.—Of the various practical hygienic problems none have claimed so large a share of public attention as the question of the proper disposal of sewage. Scientists have proposed many plans for the rendering innocuous to the health of the community this necessary product of an aggregation of human beings; but so far no method stands out prominent from the rest, and can lay claim to be, without fear of contradiction, superior to all others. This arises in a great measure from the fact that no properly organized and responsible inquiry into the merits and demerits of the several proposed remedies has yet been undertaken, nor has any plan yet received an unqualified official approval. Taking the average of the community the dry solid excrement contained in sewage is one ounce per head per day, which is distributed through 300 lbs. of water, say 15 grains per gallon; and as for the urine, while the major portion of that of adult males never finds its way direct into the sewers, of the $2\frac{1}{2}$ oz. of solids distributed through 300 lbs. of water, $1\frac{1}{4}$ ounces only is organic, one-half of which, urea, is speedily converted into innocent carbonate of ammonia. When fresh and freely exposed to air, as in the sewers only partially filled, sewage has little odour, and can scarcely be considered as offensive; but once let it accumulate in large quantities and come to comparative rest, putrefaction sets in, and it becomes viliy odorous—a seething mass full of minute organisms which live and grow and multiply in an airless deoxygenated medium. To prevent this sewage must be dealt with in one of three ways:—(1) The sewage may be at once thrown into a large volume of water, a river, or the sea, where it can be carried away by currents, diluted by diffusion, and oxygenated by the dissolved oxygen without appreciable nuisance. (2) It may be applied directly to land, if sufficient area be obtained to dispose of the sewage without offence. (3) It may be treated with chemical agents, such as either destroy the organic matter or those that destroy the agents of putrefaction, the lower organisms. The first of these methods may be dismissed from the scope of sanitation, as causing a nuisance and danger to health. As to the second plan, utilization on land, while in principle this is no doubt the right one, the fertility of the land being dependent on the restoration to it of the mineral constituents of the food grown upon it, the method from a pecuniary point of view can rarely be profitable, and commonly entails a heavy annual loss to the public bodies which have adopted it. With regard to the third method there is an erroneous notion prevalent that sewage can be effectually treated by means of chemical substances alone.

Chemical treatment directed to the end of clarifying sewage, but not of rendering it non-putrescent, is a great advantage, for the suspended solids of sewage are the chief source of difficulty in treating sewage. As to the agents to be used for clarification, if the sewage is to be used for broad irrigation, simple straining suffices; when land filtration is the plan to be adopted something more is advisable; and when the effluent is to be turned into a stream without any other treatment than a chemical one efficient clarification is indispensable—such a clarification as leaves less than a grain of suspended solids in each gallon of effluent; and even with this degree of efficiency no effluent ought to be turned into a stream unless the volume of running water is enormous in proportion to the sewage it is to receive. The chemicals to be used for precipitating sewage may be varied. The three principal are lime, lime and sulphate of alumina, and sulphate of iron. The method of treating sewage known as the A B C plan derives its name from the fact that alum, blood, and clay are the agents used.

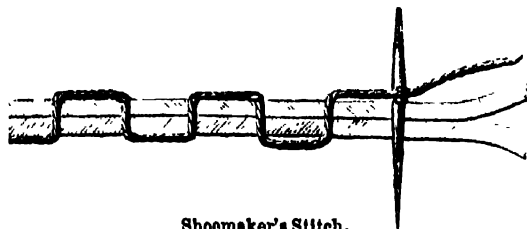
SEW'IN. See TROT T.

SEWING MACHINE, an ingenious modern automatic invention for stitching woven fabrics, leather, and similar materials. Like most other useful inventions, it is the result of the application of many thoughtful minds. Among the earlier inventors who directed their attention to it was C. F. Weisenthal, inventor in 1755 of a double-pointed needle with an eye in the middle; John Duncan, of Glasgow, in 1801, and Heilmann, in 1822, who introduced some ingenious embroidering machines. In 1830 B. Thimonnier patented a sewing machine in France, eighty of which, made of wood, were in use in 1841 for sewing army clothing at a shop in Paris. They were destroyed by a mob, as the Jacquard loom and Hargreaves' spinning jenny had been years before; but during the revolution of 1818 Thimonnier was again at work with other machines capable of making 200 stitches a minute. The mob again broke up his establishment, threatened his life, and defeated his enterprise, and he died in poverty in 1857. His machine had a vertical needle, descending from an overhanging arm, the fabric being fed upon a horizontal table by hand. The needle was driven by a treadle, and was carried back by a spring. It had the form of a crochet



Thimonnier Chain Stitch.

hook, and being driven through the fabric caught a lower thread from a thread carrier and looper beneath, and brought a loop which it laid upon the upper surface, and at the next passage brought up another and passed it over the loop previously made, thus making a double loop or chain stitch, with the loops on the upper side. The Thimonnier machine, which was patented in France on 5th August, 1818, was an improvement upon that of 1830, but retained its principal features, the needle being still worked by a treadle and a spring.



Shoemaker's Stitch.

A machine for making a through-and-through or shoemaker's stitch was patented on 21st February, 1812, by

J. J. Greenough, of Washington. The needle was pointed at both ends, with the eye in the middle, and was drawn through one way and then the other by a pair of pincers travelling on a track and opening and closing automatically. It was designed for sewing leather and other hard material, and an awl pierced the hole in advance of the needle. The leather was held between clamps, which by means of a rack could be moved each way alternately to make a back stitch, or continuously forward to make the shoemaker's stitch. The needle was threaded with a length of thread, and required refilling. The rack, after passing forward its length, was each time set back.

It is said that between 1832 and 1834 Walter Hunt of New York made a sewing machine in which he used an eye-pointed needle, attached to the end of a vibrating arm, which carried a thread through the fabric and made a loop, which was pierced by a shuttle carrying another thread, making what is known as the lock stitch. When he ap-

Slack.

Tight.

Lock or Shuttle Stitch

plied for a patent in 1834 he was refused because the main features which he claimed for his machine had been patented eight years previously by Elias Howe, and it was held that his right to a patent was forfeited by abandonment. Howe had, in fact, introduced his machine into England in 1816, when it was purchased of the inventor, a poor mechanic, by Mr. Thomas, a tradesman of Chertsey, for the sum of £250. The history of Elias Howe, who in "poverty, hunger, and dirt" laboured in his garret in Cambridgeport, Massachusetts, to perfect this machine, destined to settle a social problem which for years had been the despair of philanthropists, is perhaps one of the most instructive, and we may also say the most encouraging, we can remember in the history of inventors. From the moment he perfected his first machine, and demonstrated its power as a practical instrument by sewing a suit of clothes with it before the workmen in the Quincy Hall Clothing Factory, Boston, in July, 1815, his difficulties only seemed to increase. It is almost incredible, but it only illustrates the peculiar contradictions that he in national as in individual character, that the Americans, who are so eager after labor-saving machinery, were very slow to adopt the new invention. Howe could get no aid from his countrymen, and had to drink the bitter cup so often served to inventors. He was forced to make over half the patent to a friend for food and lodging afforded him while he was working at it, and at last, finding none of his own countrymen willing to use it, he determined to cross the Atlantic. Upon his arrival in London he was compelled by his abject poverty to put with the other moiety to an English capitalist for the sum we have mentioned. Mr. Thomas, the purchaser, induced him to remain in his service on a small stipend to adapt the machine for staymaking, the particular work which he required. This poor Howe was obliged to do, but his future seemed even more desperate here than at home; he was often in want of food, and had to pawn his clothes to obtain the necessities of life. At last he determined to leave what then appeared to him our inhospitable shores. His hopes of success being destroyed, he sailed again for America, and landed in New York in April, 1819. He soon found that his invention was being plagiarized in every direction, but, by mortgaging the half of his patent still remaining to him in America, he managed to commence an action against one of those who attempted to defraud him. Luckily he succeeded, and ever after that triumph his fortunes rose. Howe adopted as his stitch the shuttle stitch of Walter Hunt, but made the all-im-

portant addition of proper tension appliances for imparting just sufficient friction or drag to the threads to enable a tight stitch to be produced. His original machine (a working model of which may now be seen at the South Kensington Museum) contained an eye-pointed needle, supplied with a continuous length of thread from a reel; a reciprocating shuttle carrying a second or locking thread for securing the first thread in the fabric, holding plates for retaining the work against the thrust and withdrawal of the needle, and a self acting feed apparatus for propelling the work step by step at every stitch. This feeder consisted of a plate provided with sharp points or pins on one edge, upon which the work was fixed, thus answering the purpose of a basting thread in holding the work together, and hence these plates received the name of baster plates. They were propelled through the machine by a rack and pinion motion, and carried the fabric with them. The baster plate feeder, though ingenious, was defective in many respects, and was replaced by more simple and effective contrivances. Mr. Howe received a gold medal at the French Exhibition of 1867, in acknowledgment of the benefit he had conferred upon mankind as the inventor of the sewing machine, and was also created a knight of the Legion of Honour by the emperor. He died at Brooklyn on 2nd October, 1867.

Important improvements have since been introduced into sewing machines, and their variety is now almost endless. In addition to their extensive use in factories they are now found in almost every home, and most of them are provided with various ingenious attachments for hemming, tucking, braiding, cording, basting, &c., so that a good machine, with its auxiliaries, is competent to perform most of the operations required by the seamstress.

SEX. It is disappointing to note how very little has been done in the study of this important branch of biology. As yet we are completely in the dark as to the origin and meaning of sex, as to what controls the sex of offspring, and the like. The hypotheses of Darwin, especially his theory of SEXUAL SELECTION, manifestly show that he regards man as a more highly developed woman; while Spencer certainly regards woman as an arrested man. So far these two leading minds of the century agree in placing the male above the female. But there are the cases of bees and other animals strongly running counter to this view. Other yet unsolved problems are these:—Why are there more males than females born in England? Why are there more males than females in Europe generally? Why should mulattoes and other hybrid races produce a surplus of females? And why should all polygamous races of men or of animals produce large surpluses of females? Why should animals in general produce equal numbers of males and females?

It is only of late years that this really important subject has been patiently investigated. Observers are now collecting myriads of facts from which in future generations some consistent theory may be evolved. At present the general view is that the superior parent determines the sex. Darwin's excellent work (1859) takes this line. Starkweather (*Sex*, Lond. 1883) also holds that the superior parent dominates the sex, but *inversely*. This apparently absurd idea is worked out at very great length and with unwearied patience, and if the author does not convince his readers, he at any rate shows that much is to be said for his view. He shows, from observations, that a highly developed man who marries a wife inferior to himself, will have a family of girls, and *vice versa* under reversed conditions. The difficulty is in defining the terms superior and inferior; for to prove his theory Mr. Starkweather has to include vitality and mentality, strength and culture, &c.; and some of the evident exceptions to his theory are even claimed by him as proofs, on the score of the parent who was manifestly the superior by nature proving to have

degraded himself by drink or other bad habits, and thus permitted himself to have a family of his own sex.

SEXAGESIMAL, a name given to the system of reckoning in which each unit is the sixtieth part of the preceding, to which, in our day, we are only accustomed by the method of measuring angles and time. The Greeks, and Ptolemy in particular, brought this method into use in astronomical matters, and their successors seem to have attempted to make it a general mode of reckoning. In the sexagesimal arithmetic $17^{\circ} 26' 48'' 53''' 9''$ stands for 17 units + 26 sixtieths of a unit, or 26 minutes or *scrupula prima* + 48 sixtieths of a minute, or *scrupula secunda* + 53 sixtieths of a second, or 53 thirds or *scrupula tertia* + 9 sixtieths of a third, or 9 fourths, or *scrupula quarta*. Addition and subtraction are easy enough under this system; but multiplication, division, and the extraction of roots are necessarily very complicated.

SEXT (Lat. *Officium ad horam sextam*), one of the "hours" of the Roman Catholic Church. The offices of Terce and Sext usually precede and follow High Mass in collegiate churches of the Roman communion.

SEX'TANS (the Sextant), a constellation which Hevelius placed on the back of the Hydra and at the feet of the Lion. It lies directly between the bright stars α Leonis (Regulus) and α (or Cor) Hydræ.

SEXTANT. The history of this instrument was long involved in doubt, but investigation proves its course to have been as follows:—

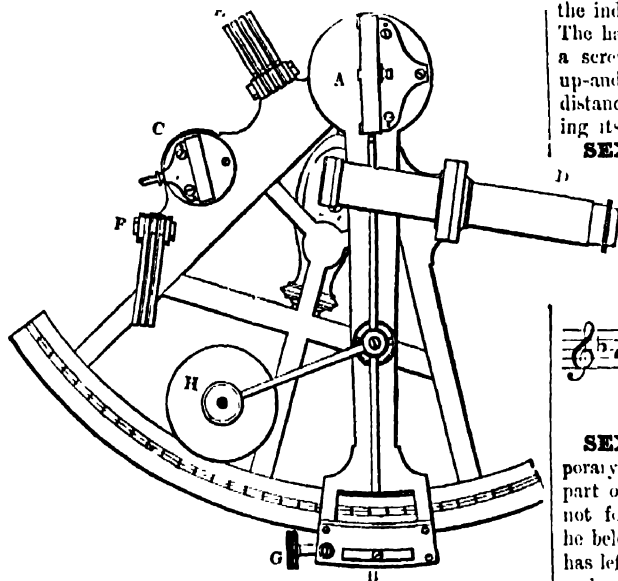
The early modern navigators used the *Cross-staff*; this was afterwards exchanged for Davis' *Back-staff*, called by the French *Quartier Anglais*. Hooke proposed an instrument for the purpose of taking altitudes at sea, which is very ingenious: the sun was seen reflected from a plane glass, while the horizon was viewed directly. Hooke does not seem to have esteemed his invention so highly as it deserved, for in a subsequent lecture on astronomy and navigation, in 1694, he makes no mention of it, but describes a quadrant of a different construction. In 1699 Newton exhibited an instrument to the Royal Society, which is described as the "old instrument mended of some faults;" and at some later time he communicated to Dr. Halley a scheme for an instrument which was probably never executed, but of which a drawing and description were found among Dr. Halley's papers after his death in 1742.

The date of the invention of Hadley's quadrant was proved, on examination by the Royal Society, to have been not later than the summer of 1730. A notice of it was given at a meeting of the Society, 13th May, 1731, and the instrument was exhibited 27th May.

At a meeting of the Society, 20th May, Dr. Halley expressed an opinion that the principle of Hadley's new instrument had been discovered and proposed by Newton, and a search was made into the minutes of the society to ascertain the fact. The only notice which could be found was that already mentioned, viz. in 1699, and this was clearly an improvement of an old instrument, and not the proposal of one new in principle.

A little after Hadley's invention, viz., about October or November, 1730, Thomas Godfrey, of Philadelphia, a glazier by trade, proposed and had executed an instrument which he called a bow, very much resembling Hadley's earlier construction. This was described in a letter to Dr. Halley from Mr. James Logan, dated 25th May, 1732. Mr. Logan had put off writing more than twelve months after the instrument was placed in his hands, and this neglect threw some doubt on the originality of the invention, which could only be satisfactorily established by additional evidence. After examination, the Royal Society came to the conclusion that Godfrey's discovery was also original. Hadley's second construction, which is incomparably superior to his first and to Godfrey's bow, scarcely differs from the present sextant.

The sextant is figured and described in almost every book of navigation, and is so commonly to be met with, that a very cursory description of it will suffice. A is a plano glass, called the *index glass*, silvered behind, and perpendicular to the face of the instrument. It is fixed on a centre perpendicular to the instrument, and moves with the *index bar*, A n, the end of which, n, slides over the graduated arc. c is a plane glass, the lower half of which, next the instrument, is silvered, and the upper half left clear. It is called the *horizon glass*, and should be



parallel to the index glass when the index points to 0° at the beginning of the arc. D is a telescope for viewing the objects observed. This should be of good quality, and with an inverting eye-piece. In the common quadrants there is merely a plate with a small hole for directing the sight. Suppose a ray of light to proceed from the eye, it will proceed in the direction of the telescope, and if it falls on the upper or unsilvered part of the horizon glass, it will pass forward in a continued straight line until it falls upon some exterior object. But if the ray falls upon the silvered part of the horizon glass, it will be reflected to the index glass (the horizon glass is so placed as to make equal angles with lines from the eye and index glass), and again reflected from the index glass outwards (i.e. from the observer), until it meets some external object. Now, instead of supposing the rays to pass from the eye, suppose them to come from external objects to the eye; then there will be two images presented at the same time, one formed by the rays which pass through the unsilvered part of the horizon glass, and another formed by the rays which have been previously reflected by the two glasses; and it is easily shown from the elementary principles of optics, that when two objects are thus apparently seen in coincidence, the angle which they subtend at the point of meeting is exactly double the angle which is contained between the planes of the index and horizon glasses, if these be supposed to be prolonged until they meet. Hence, if the index be at zero when the glasses are parallel, and if the arc be divided into half-degrees, which are numbered and subdivided as whole degrees, the arc actually read off, after any such observation as is here described, will measure twice the inclination between the glasses (for this inclination is evidently the same as the angle between the parallel position of the index glass and its new position), and, in consequence of the optical principle above mentioned, this

will be the true measure of the angle between the objects when they are so distant that the place of the eye and the intersection of the rays may be considered to be the same. The sextant, therefore, furnishes the means of measuring the angle between any two well-defined objects, in whatever direction they may be placed (so that the angle does not exceed 110°), and without requiring more steadiness than is necessary for seeing the objects distinctly. L and R are sets of dark glasses of varying intensity, which may be turned before either the index or horizon glass when required; G, a tangent screw for giving slow motion to the index bar; H, the reading microscope and reflector. The handle below is visible in the drawing, and there is a screw behind the collar of the telescope for giving an up-and-down motion to the telescope, which alters its distance from the plane of the instrument without affecting its parallelism thereto.

SEX TOLET or **SEX TUPLET**, in music, is a group of six notes, usually in the time of four notes of the same value; in fact, a sextolet is a double triplet, or it may be a triplet each note of which is halved. The latter is by far the more elegant, the former perhaps the commoner form.



SEX TUS EMPIRICUS was a physician, a contemporary of the far more renowned Galen, living in the early part of the third century of our era. He is not worthy, not for his medical, but his philosophical opinions; for he belonged to the sceptical school of philosophy, and he has left us a tolerably complete account of their methods and teachings. His chief work attacks all the sciences in turn from the sceptical standpoint. The surname Empiricus simply refers to his belonging to the school of the Empirics.

SEXUAL SELECTION is a supplementary theory on the origin of species advanced by Darwin in his "Descent of Man." The theory of "natural selection" is an attempt to explain the mode in which animals have become adapted to the varying conditions of life, leading to the endless differences between species. In his theory of "sexual selection" Darwin seeks to prove that some species have originated through the male animals having acquired an advantage with respect to reproduction over their mates of the same species, and having transmitted this advantage to their male offspring. In this way great differences other than those of the reproductive organs have arisen between the different sexes of the same species; such "secondary" sexual differences are the greater size, strength, and pugnacity of the male, his weapons of offence or means of defence against rivals, his gaudy colouring and various ornaments, his power of song, &c. Such a theory implies that there is a constant struggle on the part of the males to get possession of the females, and in many cases a selection by the latter of the most attractive males; and Darwin gives many instances of both these facts, especially among birds and mammals. Many birds, for instance, assume their brilliant hues only during the breeding season, having a plain-coloured plumage during the rest of the year; and in many the ornamental appendages become enlarged and brightly coloured at this period. While male birds usually court the females by the display of their charms or their sweet notes, among mammals sexual selection has tended rather to conferring greater strength and pugnacity on the male and special weapons, such as horns and tusks.

Mr. Wallace considers that Darwin has attached too much importance to his principle of sexual selection, espe-

cially with regard to the distinctive colours of the sexes among birds. He considers that the difference in colour between the male and female in many birds is due rather to the greater necessity for the female to be plainly coloured, since she is more exposed to danger from the practice of incubating her eggs.

SEYCHELLES ISLANDS, a numerous group, situated in the Indian Ocean, north-east of Madagascar, between 3° and 5° S. lat., and 55° and 56° E. lon. They rest on an immense bank of sand and coral, which is said to extend from north-west to south-east more than 210 miles, and in width between 30 and 90 miles. It is a kind of vast platform in the sea, on which the superstructure of the islands has been raised. The general depth of water on the bank varies between 12 and 40 fathoms. It is free from danger, but the ground-swell on it is very great. The number of islands, including the small ones, is thirty-two, of which, however, only about half are of any importance from their size or produce.

The surface of the islands is irregular, presenting a diversity of hill, rock, and ravine, without any extent or level land. The rocks are granitic; the soil is in some parts sandy, but good; it produces abundance of timber suitable for shipbuilding, wild fruit, and vegetables. Cultivation is carried on only in the narrow valleys, the soil there being deeper and richer than on the higher grounds, from which it is often washed down by the rains. The coral is used for building purposes. The island of Mahé, which is the largest, is 16 miles long and from 3 to 4 broad. The rugged chain of granitic hills which passes through its centre is about 400 feet above the sea; but one of the peaks, named Mont Blanc, rises to 3000 feet. The Seychelles Islands contain many good harbours, the principal of which is Victoria, in Mahé, where there is a guano. The climate is fine and healthy. The vegetable produce is various, and includes the *Coco de Mer*, or double coconut, about which so many wonderful fables were formerly told, of which the natives eat the fruit and use the leaves and wood for various domestic purposes. The soil is also capable of producing sugar, cotton, and other tropical productions. While in possession of the French, spices were extensively cultivated—the equable temperature and absence of hurricanes rendering the islands admirably adapted for that purpose; but to prevent them from falling into the hands of the English, all the plants were destroyed before the capitulation in 1794, and their growth has never been recommenced to any great extent. The domestic animals comprise the cow, sheep, dog, and cat. The Hawksbill and common green turtle are caught in great numbers from July to December. The population of the Seychelles is about 14,000, including many liberated Africans. About one-tenth of the total number are of European extraction.

The Seychelles were partially explored by Lazarus Picault, in 1743. About the year 1768 the French formed a colony on the island of Mahé. They capitulated to the English in 1794 but were not taken possession of. On the capture of Mauritius, however, in 1810, they were occupied; and by the peace of Paris in 1815 they were formally ceded to England, together with Mauritius, of which latter they now form a dependency.

SFAKES or **SFAX**, a townsone town in Barbary, Tunis, 138 miles S.W. of Tunis in a flat and marshy situation, on the north of the Gulf of Gabes. It has a large trade in dates, burruss cloth, olive oil, sparto grass, sponges, jessamine, rose oil, &c.; and is in telegraphic union with Tunis. The population is estimated at 40,000, including 12,000 Arabs and 2000 Jews.

SFORZA, a house famous in mediæval history, which gave a line of dukes to Milan, and produced sundry remarkable personages. It arose from Jacopo or Gherardo Attendolo, who received the surname of Sforza,

expressive of his prowess, founded the family of that name, and was styled the Great. He was a captain of Condottieri; born in humble circumstances (his father being a peasant, or perhaps a shoemaker) at Cotignola in Romagna, 28th May, 1369; drowned, whilst on a military expedition, in fording the river Aterno (since called Pescara), 3rd January, 1421. He first enlisted as a common soldier in the ranks, but distinguishing himself by bravery, mounted step by step, and at length had 7000 men at his beck. His sword was at the command of the highest bidder, and was wielded in the battles of Visconti, lord of Milan; of Florence and Ferrara; and of Joanna II., queen of Naples; whilst the services he rendered to the Roman power obtained for him the gift of his native Cotignola in fief and the title of count. He was also appointed gonfalonier to the Holy See. Jacopo Sforza was four times married, and had a numerous family of children. Francesco Sforza, first duke of Milan, son of Jacopo and his first wife, but born out of wedlock; born 25th July, 1401; died March, 1466. Trained by his father in the art of war, dignified by Joanna II. with the title of count, and endowed by her with the paternal estates, Francesco proved himself a great captain and a dexterous politician. Naples, Milan, and Venice allied with Florence, successively hired his services; and he seized the moment when his conquests had overawed Filippo Maria Visconti, duke of Milan, to obtain in marriage the hand of his daughter Bianca, who brought him the city and territory of Cremona. Visconti dead, Sforza aimed at the dukedom; other claimants arose; whilst the Milanese declared themselves for a republic. His sword and his talents unscrupulously employed made Sforza master of the occasion, and he was proclaimed duke in 1450. Many private virtues are ascribed to him, and to his munificence Milan owes various important works and splendid edifices. He was succeeded by his son, Galeazzo Sforza, who was cowardly, licentious, and cruel. He was assassinated in 1576. Upon this his brother Lodovico Maria, who was so dark as to be called *Il Moro* (the Moor), and who was popularly believed to have had a share in the death of the duke, aimed at the regency. For some years the Lady Bona, widow of the murdered duke, together with her friend the Lady Simonetta, governed wisely and well, and showed what women are capable of as rulers; but Lodovico, after endless intrigues, forced Bona to give up the regent Simonetta, and at once had her executed, 30th October, 1486. The banishment of Bona herself followed instantly. Although nominally the young Giovanni Galeazzo was duke, it was *Il Moro* who really reigned. He was one of the most skillful in intrigues and powerful princes of the time. Eventually, as the presence of the duke thwarted his plans, Lodovico placed him altogether in seclusion, practically imprisoning him. The poor youth died, probably by poison, 1494, and Lodovico proclaimed himself duke of Milan. He had invited Charles VIII. of France to assert his claim to Naples, thereby gaining the French support for his regency; but as soon as his own crown was safe he joined the league against the French, and brought them into great danger. By swiftness and valour, however, they turned the tables on him, and he was driven from his duchy by the armies of Louis XII. in 1499. Without denying the dishonest way in which Lodovico acted, it must be remembered that when Louis XII. of France, on coming to the throne, put forth a claim to the duchy of Milan as being the heir of Valentina Visconti, the duke's position was indefensible on any other ground than that of mere possession by force. His father had supplanted the Visconti, he had supplanted the heir of his father; what claim could the doubly usurping Lodovico Sforza put forth to equal a Visconti claim backed by the power of France? He was compelled to trick the French to the last moment and then suddenly betray them. In 1500 Lodovico made a desperate attempt to recover his crown,

succeeded for a few months, was then betrayed at Novara, taken prisoner and sent to France, where he died, at Loches, in 1508. Lodovico was destitute of all honour and was certainly a great criminal; yet he was an enlightened patron of art and letters, and a man of great culture and ability. He may almost stand as a type of the Italian mediæval "tyrant." Lodovico was succeeded by his son Maximilian, who regained the lost duchy in 1512, when Louis XII. had been obliged to return to France. He was crushed altogether, however, by Francis I. of France at the battle of Marignano in 1515, and ceded the duchy to that prince in exchange for a large pension. He retired to France and died there in 1530. His brother Francesco Maria, another son of "the Moor," was favoured by Pope Leo X. and the Emperor Charles V., and was reinstated in the duchy in 1521. On the approach of the French in 1524 he fled, but when Francis I. had been defeated by the imperial troops at Pavia in 1525, and when the king himself had been sent a prisoner to Spain, Francesco Maria resumed his throne by permission of the emperor. His was but a shadowy and often-threatened rule, but he died in 1535 still nominally Duke of Milan. On his death Austria quietly annexed the duchy without resistance.

SFORZANDO or **SFORZATO** is the Italian for forced, and is used in music to express a sudden or forced emphasis upon one special note or chord. It is abbreviated *sf.* and *sfz.*, or is expressed by the sign **Λ**. The general loudness of the passage should not be altered by a sforzando, as it too commonly is in the hands of careless performers; this practice completely destroys the effect aimed at by the composer. If a *sfz.* occurs in a *piano* passage the note emphasized may be sounded as *mf.*, for example, and then the passage must at once, not by *diminuendo*, return to *piano*.

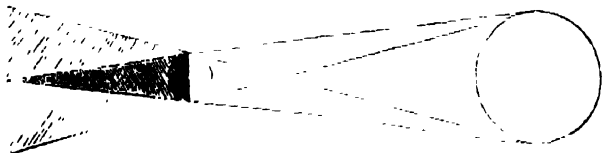
SGRAFFITO is a beautiful decorative ornament for internal architecture, produced by the cutting away of a thin coat of plaster spread over a black surface, so that black lines are thus exposed. Sometimes other colours than black are used for the base.

SHAD is the name of several species of fishes belonging to the same genus, **CLUPEA**, as the herring, sprat, pilchard, &c. The Common or Alice Shad (*Clupea alosa*) is found on the coasts of temperate Europe and Britain. It ascends large rivers, such as the Severn, Seine, and Rhine, in large groups, though in the sea it is more or less solitary. It enters rivers in May, returning to the sea about the end of July. The shad resembles the herring in appearance, but is proportionately thicker and deeper, and much larger; it is not uncommonly 2 feet long, and sometimes reaches as much as 4 feet. From its size and resemblance to the herring it is called by our fishermen the "king of the herrings." The shad is bluish on the back, silvery on the sides and belly, with several large blackish blotches on the sides. The shad is toothless, and is further distinguished by having from sixty to eighty very fine and long gill-rakers on the horizontal part of the outer branchial arch. The flesh is used as food, its value increasing in proportion to the distance up the river at which the fish was caught. The Twaito Shad (*Clupea finta*) resembles the common species very closely, both in appearance and habit, but is distinguished by the possession of from twenty-one to twenty-seven stout osseous gill-rakers. It agrees with the common shad generally in its distribution, but is commoner in the Mediterranean, and abounds in the Nile. It was formerly common in the Thames. It is usually from 12 to 16 inches in length. It ascends rivers a few weeks later than the common species. Its flesh is also coarser and less esteemed. The American Shad (*Clupea sapidissima*) is abundant on the Atlantic coasts of North America, ascending rivers to deposit its spawn. It is more valuable as a food fish than the European species. Allied valuable American fishes are the Ale-wife (*Clupea*

mattonocca) and the Murrain or Mossbanker (*Clupea menhaden*).

SHAD DOCK (*Citrus decumana*) is a species of **CITRUS**, to which genus the orange, lemon, citron, &c., belong. The shaddock is probably a native of the Malay Archipelago, but is now cultivated in most tropical countries. It is distinguished by its large leaves on winged stalks, and by both the young shoots and leaves being downy on the under surface. The flowers are large and white. The fruit is very large, weighing sometimes from 10 to 20 lbs., roundish, with a smooth, pale, yellowish thick skin, and a whitish or reddish delicate subacid juicy pulp, which is agreeable and cooling. When shaddocks arrive at their greatest size they are called Pompeeloes or Pompehousses; the smaller form is the Forbidden Fruit of the English markets. The name is said to be derived from a Captain Shaddock, who carried the fruit from China to the West Indies early in the eighteenth century.

SHADOWS are due to the interception of light by opaque bodies, and their form is conditioned by the shape of these bodies and the angle at which they fall on the surface which receives them, as well as by the shape of that surface. Rounded simply as existing in a shadow cone, radiating in lines drawn from the luminous point through all the bounding edges of the body. Has not been called the shadow-cone. When the light source is a cone of some size it is evident that besides the *umbra* or shadow proper, there will be also a *penumbra*, or partial shadow, in the cone of shadow thrown from the luminous point on any one edge or "limb" of the illuminating body will der



from the cone of shadow thrown from the luminous point on the opposite edge or limb. Where these cones coincide will be deep shadow, where they do not coincide will be partial shadow. Bodies passing into the penumbra are therefore but partially thrown into shadow. The penumbra gradually melts into the umbra, the line of demarcation having been exaggerated and made definite in the diagram for purposes of explanation only. The cone of the penumbra always diverges, and is infinite; and in the case of the luminous body being smaller than the opaque body, the cone of the umbra diverges, and is infinite also; but where the luminous body is larger than the opaque body the cone converges, and the umbra has a definite terminal point. The latter is the case with the sun and the earth, and though the immense distance of the sun makes the earth's umbra of enormous length, yet it does not reach to the nearest planet.

Sound shadows are not nearly so definite as light-shadows, because the waves of sound, being longitudinal, in contrast to the waves of light, which are transverse, are more readily bent from their course, and (like water waves) incline to lap round an obstruction, and then proceed on their course. Nevertheless, we all are accustomed to the production of sound-shadows, as when a train passes behind a hill, and we lose its noise for a few moments. The feeling of a sound-shadow is shown by the behaviour of the ear in explosions, when the back windows of houses are always found to be damaged by the explosion as well as the front ones, though to a less degree.

SHAD WELL, THOMAS, poet laureate in succession to Dryden, when the latter had become a Roman Catholic, was of good Staffordshire family, and was born in 1610 at Stanton Hall in Norfolk. He was educated at Cambridge,

and entered at the Middle Temple. He returned from a continental tour to throw up his profession for the drama (1669), and had considerable success. The amount of his taste may be measured by his triumphant exclamation as to "Timon of Athens." "Originally Shakspeare's," says he, "who never made more masterly strokes than in this, yet I can truly say I have made it into a play." In 1682 Dryden published his famous "Medal," a splendid invective against Shaftesbury, whose image was on the obverse of the medal struck to commemorate the failure of the bill against him. To this Shadwell wrote a savage personal answer, scurrilous and bitter, against the great poet, which he called "the Medal of John Bayes (Dryden's nickname), a Satyr against Folly and Knavery." Dryden replied in October, 1682, with the immortal MacFlecknoe; setting forth how Flecknoe (a deceased poetaster of admitted dullness) had chosen for his successor on the throne of non-

"Shadwell: alone of all my sons is he
Who stands confirmed in full stupidity;
The rest to some faint meaning make pretence,
But Shadwell never deviates into sense."

The coronation and blessing of Shadwell as MacFlecknoe fellow, and then the aged monarch sinks to nothingness—

"Sinking he left his druggist robe behind,
Borne upwards by a sehteri mean wind."

And this royal robe adorns with double virtue his chosen successor. As was said above, Shadwell replaced Dryden as laureate in 1688, for the times were so poor in literature, that, dull as he was, there was at that time no one better, save Wycherley, and he was not eligible for other reasons. Shadwell died in December, 1692, and was succeeded as laureate (*proh pudor!*) by Nahum Tate. Shadwell had written in all fourteen plays.

SHAFT, in architecture, is the term applied to a small column, one of a group clustered round a central pier, or decorating an arch or a window. Shafts are frequently of marble or other fine stone; and the detached coloured shafts of Byzantine and Venetian architecture are one of their most prominent features. In other styles the shafts form part of the pier, and are made of the same material. Shafts give a feeling of lightness which the solid pier or column can never acquire, although, of course, in many cases they actually add to the bulk of the pier they ornament. The main body of a column is also often called its shaft.

SHAFTESBURY, a municipal borough of England, in the county of Dorset, near the borders of Wiltshire, about 25 miles north-west by north from Dorchester, and 104 miles from London by the South-western Railway—being 3 miles distant from the Sturkey station. The situation of the town is bleak and exposed, mostly on the top of a steep hill. Though irregular, it is well built, most of the houses being of freestone quarried in the neighbourhood. From many parts of the town there are beautiful views of Dorset, Somerset, and Wilts; and notwithstanding its height, the town is well supplied with water, which is chiefly drawn by machinery from reservoirs. There are four churches (three ancient and one modern), and several places of worship for dissenters. There are also a handsome town hall and some schools and abbeys. A handsome cottage hospital, in memory of the Marquis of Westminster, was built in 1875. The municipal borough is governed by four aldermen and twelve councillors. The population in 1881 was 2312. The separate parliamentary representation of Shaftesbury ceased under the Redistribution of Seats Act of 1885. The town confers the title of earl on the Ashley-Cooper family.

Shaftesbury is a town of high antiquity. Camden comes to the conclusion that it owes its origin to King Alfred, A.D. 880, which seems to be confirmed by an inscription

on a stone in Latin, the translation of which is, "King Alfred built this city in the year of our Lord 880, and in the eighth year of his reign." Alfred also founded a nunnery here. His charter is still in existence, and in after times the establishment rose into high repute, becoming the resort of pilgrims in consequence of having been the burial-place of Edward the Martyr. Canute, the Danish king, died in Shaftesbury, but was interred at Winchester. Ethelgele, Alfred's daughter, was the first superioress of the abbey, which became exceedingly rich from the lands that were bestowed upon it and the offerings that were laid upon the shrine of the martyr, where miracles were said to be performed. So wealthy was this establishment that it gave rise to the saying, that "if the abbot of Glastonbury were to marry the abbess of Shaftesbury, their heir would be richer than the King of England."

SHAFTESBURY, EARL OF (ANTHONY ASHLEY-COOPER), an English statesman, was born at Wimborne-St.-Giles, in Dorsetshire, 22nd July, 1621. His father was Sir John Cooper, of Rockbourne, Hants, and his mother Anne, daughter of Sir Anthony Ashley, Queen Elizabeth's secretary of war. He studied at Exeter College, Oxford, and at Lincoln's Inn, and represented Tewkesbury in the Short Parliament of 1640. In the Civil War he first supported Charles I., but in 1644 went over to the Parliament, raised a force in Dorsetshire, stormed Wareham, and reduced the surrounding country. He was a member of Cromwell's parliaments, and was appointed by the Barebones Parliament one of the council of state, though openly opposed to many of Cromwell's measures. He retired from the council in 1654, and was a leader of the opposition in Parliament both before and after Cromwell's death. He was active in the overthrow of the second protectorate and the restoration of Charles II., being a member of the commission sent to Breda to invite his return, and was appointed governor of the Isle of Wight, lord lieutenant of Dorsetshire, chancellor of the exchequer, and a privy councillor, and in April, 1661, was created Baron Ashley. He was one of the commission for the trial of the regicides, whom he prosecuted with zeal. As chancellor of the exchequer he appears to have had almost the entire management of the treasury in his own hands; but so long as Clarendon retained his influence, he was found acting with what we may call the opposition section of the ministry. He vehemently opposed the persecuting Corporation Act, the Uniformity Bill (against which he is said to have spoken 300 times), and the Militia Act. After the fall of Clarendon, Shaftesbury formed one of the celebrated Cabal ministry, but he has never been accused of having received any of the French gold with which his associates were bribed, and appears to have resisted, though ineffectually, the shutting up of the exchequer in January, 1672.

In April, 1672, he was created Earl of Shaftesbury; and in November following, on the resignation of Sir Orlando Bridgman, was raised to the office of lord chancellor. His conduct in this office has been represented in very opposite lights; but it appears that, without much knowledge of law, his natural sagacity enabled him to do substantial justice in most cases that came before him, and to acquit himself to the satisfaction both of the public and the profession. He retained the seals till November, 1673, when he was dismissed from office, no doubt by the influence of the Duke of York and the Roman Catholic party. Among other reasons for his dismissal was probably the undoubted fact that he opposed reckless grants to the king's mistresses.

He now openly joined the ranks of the opposition, which, being in a majority in the House of Commons, could only be kept in check by repeated prorogations. When Parliament reassembled in February, 1677, he contended that it had been actually dissolved by being so long kept in a

state of suspension; upon which the House of Lords voted that he should acknowledge his error, and beg the king's pardon on his knees at the bar, and, having refused to do this, he was committed to the Tower. He applied to the Court of King's Bench, and repeatedly petitioned both the king and the House of Lords; but was not released till he consented, after an imprisonment of above a year, to make the submission originally required. In November, 1680, the House of Lords resolved that these proceedings were "unparliamentary from the beginning, and the whole progress thereof," and ordered them all to be obliterated from their journals.

Shaftesbury took the fullest advantage of Titus Oates' disgraceful Popish Plot (although there cannot be much doubt that he knew the whole affair was a clumsy falsehood), and he was the author of the Test Bill of 1678, under which Catholics were excluded from Parliament for 151 years. As president of the new permanent council he became nominal chief of the government; but, aware of the instability of his condition, he determined that the Duke of York should be excluded from the succession. In 1679 he framed and caused to be passed the Habeas Corpus Act, which was for some time known as "Shaftesbury's Act." Parliament being dissolved and Shaftesbury dismissed, he became more violent than ever, induced Monmouth to return home, and tried to procure the indictment of the Duke of York as a recusant. In the Parliament of 1679 the Commons were completely under his influence, and he carried resolutions against the Duke of York, and caused the Exclusion Bill to be again brought forward, which rapidly passed the Lower House, but was thrown out by the Lords. The king again dissolved Parliament, and the next one met at Oxford; but Shaftesbury being still all-powerful in the Commons, it was soon dissolved (1681). The earl was arrested by order of council on the charge of high treason, and the benefit of his own Habeas Corpus Act was denied him; but the grand jury threw out the bill, and the earl was liberated. He left England and reached Amsterdam in 1682, where he was admitted to the magistracy. This secured his personal safety, and he resided there till his death on 21st January, 1683. He wrote memoirs of his own times, and intrusted them to his friend, John Locke, who destroyed them, frightened, it is said, by the execution of Algernon Sidney.

The character of Shaftesbury has been painted in unfairly dark colours by Dryden and Macaulay, and while Mr. Christie has done much to rehabilitate him, he occasionally writes as if he held a brief for the defence. Shaftesbury's career was undoubtedly sullied by many acts which cannot be defended, but it is only fair to him to remember that up to the Restoration his guiding principle was ever to maintain the supremacy of Parliament, and that this principle, however obscured by self-interest, really underlay the whole of his future career. He was, too, always on the side of an enlightened trade policy. Moreover, in an age of general corruption he was always incorrupt, and never grasped either money or land. To him the credit or discredit attaches of having done more than anyone else to found the present system of government by party in England, and the most correct general estimate of his character cannot perhaps be given better than in the words of Mr. Trill: "In his single person he typifies all the passion and profligacy, all the reckless turbulence and insatiable ambition of the troubled times in which he lived, but those three most notable actors on the stage of later English politics—the modern demagogue, the modern party leader, and the modern Parliamentary debater—are in him foreshadowed also. It is in Shaftesbury that we first meet with that combination of technical knowledge, practical shrewdness, argumentative alertness, aptitude in illustration, mastery of pointed expression, and readiness of retort which distinguish the first-rate debater of the present

day. . . . His parliamentary oratory is to this day a living thing; but it is his achievements as party leader, it is those qualities of organization and command which enabled him to convert the first subservient Parliament of Charles II. into a force of passive resistance to the anti-national policy of the sovereign, and to use the three succeeding Parliaments as powerful engines of attack upon the government and court party—it is these performances and powers which secure to Shaftesbury a memorable place in the history of the development of our constitution."

A "Life of Shaftesbury," drawn up under the direction of his great-grandson, the fourth earl, was reprinted in 1836, in two vols. 8vo. This was supplemented in 1871 by a very complete and exhaustive biography by W. D. Christie, M.A., much of the material being furnished by the seventh earl. But the most fair and impartial memoir will be found in "Shaftesbury" in the English Worthies Series, by H. D. Trill (London, 1886).

SHAFTESBURY, ANTHONY COOPER, third Earl of, a distinguished philosopher, grandson of the preceding and son of the second earl, was born in London in 1671. As the eldest son and heir to the earldom, he was taken by his grandfather and educated under his eye by the celebrated English philosopher Locke. In his twenty-third year he entered the House of Commons as member for Poole. It was during the session of 1696 that he turned so happily to account his own hesitation and nervousness when addressing the House. The matter in debate was the bill for regulating trials in cases of high treason, and Shaftesbury was pleading that the accused should be allowed the assistance of counsel. With prompt ingenuity he made his own breakdown an argument in favour of the concession, by saying: "If I, sir, who rise only to give my opinion on the bill now depending, am so confounded that I am unable to express the least of what I proposed to say, what must the condition of that man be who, without any assistance, is pleading for his life? Delicate health, and perhaps a wish to indulge his intellectual tastes, led him to resign his seat in 1698, and he

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Shaftesbury is commonly reputed to be the author of the doctrine that "inducement is the test of truth," but nowhere, we believe, in his writings is it so strongly expressed; at most it seems to us, he pleads for the permission to employ the weapons of wit and pleasantry in discussions on serious subjects. Certainly, elevation both of thought and style characterized his own writings, and gave them one of their principal charms. Shaftesbury's "diction," says Lord Macaulay, "affected and florid, but often singularly beautiful and melodious, fascinated many young enthusiasts. He had not merely disciples, but worshippers. His life was short, but he lived long enough to become the founder of a new sect of English freethinkers, diametrically opposed in opinions and feelings to that sect of freethinkers of which Hobbes was the oracle. During many years the 'Characteristics' continued to be the gospel of romantic and sentimental unbelievers, while the gospel of cold-blooded and hard-headed unbelievers was the 'Leviathan.'" It is in his ethical speculations that Shaftesbury appears to most advantage as an original thinker. Although they

are amenable, like all his philosophical writings, to the charge of vagueness, yet the existence of a "moral sense," deriving from the heart, not the head—the offspring of feeling, not of reason or calculation—is asserted in them with distinctness enough to lead Sir James Mackintosh to say that the "Characteristics" contain "more intimations of an original and important nature on the theory of ethics than perhaps any preceding work of modern times."

Shaftesbury's amiability and sweetness of character was one of his principal characteristics. In the popular mind he is generally regarded as hostile to religion, but although certainly not orthodox, if judged by the standard of any particular church, his temperament was pre-eminently a religious one, and the belief in a God, all-wise, all-just, and all-merciful, governing the world providentially for the best, pervades all his works, his correspondence, and his life. He scrupulously conformed to the outward ordinances of the church, but there were many things in the lives and teachings of the ecclesiastics of his day which were calculated to repel such a man as Shaftesbury, and this begot in him a certain amount of repugnance to and contempt for some of the doctrines of Christianity itself. As an earnest student and ardent lover of liberty, an enthusiast in the cause of virtue, and a man of noble and liberal and unending benevolence, Shaftesbury probably felt no superior in his generation. He was especially fond of the works of Marcus Aurelius, and the influence of that great philosopher is manifest in many of Shaftesbury's own writings. For a good understanding of Shaftesbury's philosophy see "Shaftesbury and Hutcheson," in the *English Philosophical Society*, by Prof. L. F. (London, 1882), and *Memoirs of the Life of Lord Shaftesbury* (London, 1886).

SARAFUS, CHA. RICH. HOS. Sir ASAPH COOPER, Bart., 1st baronet, a distinguished and successful philanthropist, born on 28th April, 1801, was the eldest son of the Rev. John and great-grandson of the third earl. He was educated at Harrow and Christ Church, Oxford, where he took the first class in classics in 1822. As Lord Ashley he entered the House of Commons as member for Woodstock in 1826. In 1830 he represented Dorchester, and in the same year married Lady Lucy Cooper. In 1831 he was returned for the county of Dorset, which constituency he represented until 1846. At the general election in 1847 he was elected as one of the members for the city of Bath, and continued to sit for that borough till the death of his father, in 1851, elevated him to the dukedom. At the outset of his public career he was in politics a Tory, and during the first brief ministry of Sir Robert Peel, in 1835, he was civil lord of the admiralty; but in 1841, when Sir Robert came in the second time, Lord Ashley refused to take office on the ground of a difference of opinion between himself and the prime minister on the Ten Hours Bill—a question to which he had devoted his whole influential force and attention. From that time forth Lord Ashley and Earl of Shaftesbury, he continued a Conservative in politics, his politics being his philanthropy, and his party grounds he was thus enabled to cross state and dog-slayer with perfect impunity. His philanthropic work was great in its idea and execution. His first efforts were in behalf of chimney-sweepers' apprentices, and it was then by his energy and perseverance that a Royal Commission was appointed to inquire into the employment of women and children in mines, at the pits, in the factories, and in various other branches of industry conducted by their labour. The report of this commission aroused the indignation of the country, which had never dreamt of the awful evil that existed. Next to factory legislation, Lord Shaftesbury's name is most closely associated with the cause of ragged schools, the shoeblack brigade, the reformatory and refuge union, and common-lodging-house reform, and his efforts to ameliorate the condition of the

costermongers, flower girls, juvenile beggars, &c. As a practical philanthropist he laboured with unabated energy and unwearying assiduity, being at the head of every movement calculated to improve the religious, social, economic, and physical condition of all communities. He was the most beloved and honoured man of his generation by the poor, the outcast, and the working-classes. He died 2nd October, 1885, and was honoured by a public funeral at Westminster Abbey, after which his remains were interred at his model village of Wimborne-St.-Giles, Dorsetshire. The motto of his family, "Love and Serve," was nobly exemplified in his life. (See "The Life and Work of Earl Shaftesbury," by Edwin Hodder, London, 1886.)

SHAG (*Phalacrocorax graculus*) is a British species of CORMORANT, distinguished from the common species by its green colour and smaller size. The shag or crested cormorant is more abundant on the west coast of Scotland than the common species. It frequents rugged coasts and rocky islands, building its nest frequently in caves. It breeds also in the Channel Islands, on the coasts of Norway, Spain, France, and the Mediterranean region generally. The nest is made of seaweed, twigs, and grass matted together, and contains from five to eight eggs. The shag feeds chiefly on sea fish, which it catches like the common species. It is never found far from the coast.

SHAGREEN, a kind of leather. See LAMIN.

SHAHI, the Persian penny, usually found in silver pieces of four shahis, value 4d. when new. Those usually in circulation, however, are so battered as only to pass at 2d. or thereabouts. The shahi is the hundredth part of the toman.

SHAH-JEHAN, or "King of the World," the title assumed by Khurram-Shah, the fifth of the Mogul emperors of India, who succeeded his father Jehangir Selim Shah in 1627 (A.H. 1037). In his father's lifetime he had distinguished himself by his bravery and military skill; and when, in 1628, the revolt of a powerful chief named Khar-Jahan Lodi, who took refuge with the independent Muslim kings in the Deccan, gave rise to a war, the contest, after continuing for several years, ended in the subjugation of the kingdom of Ahmednuggur (1631), while the more powerful states of Bejjapur and Golkonda were in 1636 rendered tributary to the court of Delhi. A dangerous illness which seized Shah-Jehan in 1657 led to a civil war between his four sons for the succession. Aurungzebe, who gained the victory, confined his father to the citadel of Agra, where he died, December, 1666. The magnificence of Shah-Jehan's court was unequalled even in the tales of Oriental pomp. The famous Peacock Throne, the jewels composing which were valued at £7,000,000, was constructed by order of this prince. The superb white marble mausoleum of the Taj-Mahal at Agra, which he built for the sepulchre of his favourite queen, and in which he himself lies interred, is unsurpassed perhaps by any similar edifice. Shah-Jehan was a wise ruler, for a Mogul; but the system of that dynasty rested simply on the sword; there was no central point about which the empire could gather. His great sagacity, his frequent successes, his careful administration (he left £24,000,000 of money at our value in the treasury), and his considerable industry, served only for the time; they ceased with his deposition, being purely personal, and the empire almost at once began to totter. In his youth Shah-Jehan had rebelled against his father; in his age his sons rebelled against him. Rebellion and insurrection, incessant conquest or defeat, such was the fruitless course the great Mogul Empire ran throughout its career.

SHAKE, in music (indicated by *tr.*, the two first letters of the Italian *trillo*), is the alternate and rapid iteration of two sounds which are not less than a semitone nor more than a whole tone apart.

SHAKERS, a religious sect which arose in England, in Lancashire, about 1747. The founders were Quakers, and they were called Shakers from the violent shaking of their bodies in their religious exercises. In 1758 they were joined by Anne Lee, a blacksmith's daughter, who seems to have been a hypochondriacal religionist, and who in 1770 laid claim to divine inspiration. In 1774 she and some of her followers set sail from Liverpool for New York. Anne Lee fixed her residence at Watervliet, on the Hudson, not far from Albany, where she died in 1784. The Shakers are generally distinguished for good conduct in the common business of life. They agree with the Quakers in their abhorrence of war, their objection to take oaths, and in the belief of the direct influence of the Holy Spirit; but their peculiar characteristic is their entire renunciation of marriage. The members live together simply as brothers and sisters, and as they are thus precluded from the ordinary sources of increase, they have to rely solely on their converts from other denominations for the support and extension of their sect. Instead of the original violent shaking, they now move round their hall of worship in a regular and uniform dance to the singing of a hymn, clapping their hands in unison. There are about 5000 Shakers in the United States. Their chief settlement is New Lebanon, 14 miles S.E. of Albany, in New York state. A small society, the members of which were popularly known as Shakers, but who styled themselves "Bible Christians," was founded in England in 1869 by Mrs. Gilling, the wife of a Suffolk farmer. She started a "family" in London in 1871, on the basis of celibacy and community of goods, and in eighteen months moved to New Forest Lodge, near Lynnhington; but the only wealthy member having been transferred to a lunatic asylum, the "family" got into debt and were ejected, 15th December, 1874. After this they lived in a barn, and then in a field till August, 1878, when they were again ejected. They indulged much in dancing, and lived huddled together in a hovel. Their numbers gradually dwindled, and they finally dispersed after the death of their "mother," Mrs. Gilling (who had always predicted that she should never die), in 1886.

SHAKESPEARE, WILLIAM. In the register of baptisms of the parish church of Stratford-upon-Avon we find, under the date of 26th April, 1564, the entry of the baptism of William, the son of John Shakespeare. The entry is in bad Latin—"Gulielmus filius Johannes Shakespeare." The date of William Shakespeare's birth is traditionally taken as three days before his baptism, but there is no real evidence of this fact. John Shakespeare, the father of William, as shown by these registers, was married and living in the parish of Stratford in 1558. He came from Snitterfield to Stratford in 1551. In the archives of the town, by which his course may be traced for some years, we find that he was, in 1556, one of the jury of the court leet; in 1557, one of the ale tasters; at Michaelmas of that year, or very soon afterwards, he was elected a Burgess or junior member of the corporation; in 1558 and 1559 he served the office of constable, which duty appears then to have been imposed upon the younger members of the corporate body; lastly, in 1561, he was elected one of the chamberlains. In 1568 he attained the highest corporate dignity of high bailiff or mayor; and in 1571 he was chief alderman. John Shakespeare was especially a glover, but also a wool stapler and leather merchant, and he dealt as well in corn and wood. The mother of the poet was Mary Arden of Asbies, of an ancient family, the daughter and one of the heirs of Robert Arden of Wilmeote, and connected with the Warwickshire Ardens of Parkhall; thus being a gentlewoman by birth. John and Mary Shakespeare were married in 1557.

Of these parents, then, was William Shakespeare born, in 1564, in the town of Stratford. He was the third child of his parents, but the two girls who preceded him both

died young. In that town there is a street retaining its ancient name, Henley Street, being the road to Henley-in-Arden, where stood two houses with a garden and orchard annexed to each; and these houses were purchased in 1556 and 1575 respectively by John Shakespeare. It is said, and there is no reason to doubt the tradition, that the poet was born in one of these houses, which still stands as it was, altered according to modern fashion, its gable roofs destroyed, divided and subdivided into smaller tenements. The walls of the bedroom where he is said to have been born are covered literally with thousands of names, inscribed in homage by pilgrims from every region where his glory is known. That house now belongs to the British nation, purchased by voluntary subscription. At the time when Shakespeare's father bought it, no doubt it was a mansion as compared with the majority of houses in Stratford. The dwelling-house was not bought till the Shakespeares had lived there eighteen years; the wool-shop was bought in 1556. The two houses were in communication inside.

The free school of Stratford, where Shakespeare was educated, was founded in the reign of Henry VI., and received a charter from Edward VI. It was open to all boys, natives of the borough, and, like all the grammar-schools of that age, was under the direction of men whose graduates of the universities, were qualified to demand a sound scholarship which was then the boast of England. We know from contemporary evidence that Latin was not only written, but habitually spoken in school in the English form; Greek was not much studied, except in these country schools. Ovid, Cicero, Virgil, Juvenal, Seneca, and the comic dramatists were all studied at Stratford.

There are local associations connected with Stratford which could not be without their influence in the formation of the poet's mind. Within the range of such boy's curiosity were the fine old historic towns of Warwick and Coventry, the sumptuous palace of Kenilworth, the ruined monastic remains of Evesham. His own Avon country, with spots of singular beauty, quiet hamlets, and tiny villages. Nor was Stratford shut out from the general world, as many country towns were. It was a great highway, and dealers with every variety of merchandise resorted to its fairs. When the poet was eleven years old Queen Elizabeth made her celebrated progress to Lord Leicester's castle of Kenilworth; and Shakespeare may well have been a witness to some of the "princely pleasures" of masques and mummeries which were the imperfect utterances of the early drama. At Coventry, too, the ancient mysteries and pageants were still exhibited in the streets, the last sounds of those popular dramatic exhibitions. More than all, the players came to Stratford, their first visit being under his father's mayoralty, and probably at his father's invitation.

William Shakespeare's family, about his fourteenth year, became embarrassed in their circumstances, and subsequently fell into poverty. A passage in the "Life" by Rowe (1709) runs as follows:—"His father, who was a considerable dealer in wool, had so large a family, ten children in all, that, though he was his eldest son, he could give him no better education than his own employment. He had bred him, it is true, for some time at a free school, where, it is probable, he acquired what Latin he was master of; but the narrowness of his circumstances, and the want of his assistance at home, forced his father to withdraw him from thence, and unhappily prevented his further proficiency in that language. It is without controversy that in his works we scarce find any traces of anything that looks like an imitation of the ancients." Rowe then goes on to assume that because he did not copy from the ancients he had never read them; he has given us no facts to prove the narrowness of his father's circumstances. There is abundant proof, however, that in 1578 John Shakespeare was in "distressed circumstances." He had married a gentle-

woman who brought him the Asbies, 60 acres of land, and a comfortable sum of money. His honours in the corporation, his good house, and evidently liberal disposition, had dipped deeply into his fortune: and in 1578 he had to be excused payment of half his taxes. He had mortgaged the Asbies in that year, sold his interest in some Snitterfield property, and lost his little daughter Anne, and his fellow townsmen could not be hard upon a general favourite. The lad was withdrawn from school, and the living of the household strictly curtailed. Nevertheless matters were not altogether amended, for John Shakespeare was arrested for debt, in default of any goods to seize, both in 1585 and 1586; and in 1592 we read "that John Shakespeare cometh not to church for fear of proceesse for debts." In 1596 the poet had already made great way in his double profession of actor and playwright in London, and had saved money, having a shrewd business side to his character, too rarely met with in men of his consummate genius; and in the most generous way he used his own prosperity to reinstate his father in something like his former position. He also gratified the old man's vanity by procuring him a grant of arms, which John Shakespeare had vainly tried to obtain when he was mayor, so that he became an "esquire," and could proudly transmit the dignity to his descendants. Next year William Shakespeare successfully contested and overthrew the mortgage on the Asbies for his father, which the mortgagee was seeking to foreclose unfairly, and paid off the mortgage. John Shakespeare did not live long to enjoy his son's benefactions: he died in 1601.

It is sometimes said that men of great genius inherit it from their mothers. We know too little of Shakespeare's mother to say what was the case with him in this particular, but we do know that she was a gentlewoman by birth, and of a fine old country family, and can therefore, with some confidence, regard her as the source of that "gentleness" (what in our own days would be called good breeding or fine manners) which all Shakespeare's contemporaries are fond of attributing to him as a distinctive characteristic. To Ben Jonson, even, he is the "gentle Shakespeare," that is, a gentleman in the highest sense of the word; and in a curious and little-known passage from Spenser, given below, the same adjective of "gentle" is used and enforced as specially applicable to Shakespeare. We know nothing mean or sordid of Shakespeare. He sues for his debts in a straightforward way, but no man sues him at any time; and we are entitled to assume that he differed *totocorda* from the swaggering roystering Greeces and Marlowes who were his contemporaries and predecessors. Chettle, who had a strong prejudice against him at first, especially mentions that he was "honest," the Elizabethan term for a quality which we now express by "honourable." Chettle had had a hand in publishing Greene's malicious attack on Shakespeare in the "Groat's Worth of Wit" (1592), and when he came to know the poet, he hastened thus to publicly apologize for having assisted to defame him. "I am so sorry as if the original fault had been my fault; because myself have seen his demeanour no less civil than he excellent in the qualities he professes; besides divers divers of worship have reported his uprightness of dealing, which argues his honesty, and his facetiousness in writing, which approves his art."

When Shakespeare left school, in 1578, it seems most likely that he helped his father for a while and then tried several employments. There are traditions placing him in a lawyer's office, making him out a school teacher for a while, and so on. It is not unlikely that he gained his vast experience of life in so many of its various conditions in some such way. The earliest biography, that of Rowe, written in 1709, less than a century after the poet's death (1616), says, "Upon his leaving school he seems to have given entirely into that way of living which his father proposed to him; and in order to settle in the world after a friendly manner, he thought fit to marry while he was yet

very young. His wife was the daughter of one Hathaway, said to have been a substantial yeoman in the neighbourhood of Stratford." The information, which Betterton had collected, as to his early marriage was perfectly accurate. He did marry "the daughter of one Hathaway," who was no doubt "a substantial yeoman in the neighbourhood of Stratford." At Shottery, a pretty village within a mile of the town, there is yet a farmhouse, now divided into two tenements, where it is affirmed that Hathaway dwelt. By a copy of a court roll, of the date of 1513, it appears that John Hathaway then held a copyhold at Shottery. The identical farmhouse or cottage, with its little garden and orchard, remained in the possession of the descendants of the Hathaways till 1838: it was then sold. William Shakespeare was married to Anne Hathaway, 28th November, 1582. He was then eighteen years and a half old. This was indeed an early marriage. His wife was considerably older than himself. Her tombstone states that she died "on the 6th day of August, 1623, being of the age of sixty-seven years." In 1623 Shakespeare would have been fifty-nine years old. The marriage bond and license were discovered among the papers of the Consistorial Court at Worcester in 1836. This, of the 28th of November, 1582, was the formal ceremony of marriage. It was no doubt, according to the almost invariable practice of the time, preceded some months before by the solemn betrothal, quite valid, in those days, as a contract by itself. Upon this point of the validity of betrothal see the climax of George Peele's contemporary drama, "The Old Wives' Tale," where a magic light has to be blown out by a woman who is neither maid, wife, nor widow; and Venelia, who is betrothed but not yet married, is able, as no longer being a maid, to fulfil the conditions. We may regard him without doubt as married by betrothal in the summer of 1582, soon after he was eighteen. This accounts for his eldest child Susanna being born in May, 1583. Early in 1585 twin children were born to him, and they were baptized on the 2nd of February as "Hamnet and Judith." He thus had a wife and three children before he was of age.

The cause which drove Shakespeare from Stratford is thus stated by Rowe, on the authority of Betterton the actor:—"He had, by a misfortune common enough to young fellows, fallen into ill company, and, among them, some that made a frequent practice of deer-stealing engaged him more than once in robbing a park that belonged to Sir Thomas Lucy, of Charlecote, near Stratford. For this he was prosecuted by that gentleman, as he thought, somewhat too severely; and in order to revenge that ill usage he made a ballad upon him. And though this, probably the first essay of his poetry, be lost, yet it is said to have been so very bitter that it redoubled the prosecution against him to that degree that he was obliged to leave his business and family in Warwickshire for some time, and shelter himself in London." All this, among a great deal of falsehood, probably contained some tissue of the truth, such as the truth appeared to the good old folks of Stratford in Betterton's time, who had heard stories from their grandfathers of what a wild young fellow the rich man was who bought the largest house in Stratford. The deer-stealing tradition is set right when we discover that there was no park, properly so called, at Charlecote. But there was a deer-park running for a mile or so with Charlecote, separated only by a shallow fordable reach of the Avon; and this was Fulbrook. It had been given by Queen Mary to Sir Francis Englefield, and when he fled the country in the next reign, on account of his being a Roman Catholic, Queen Elizabeth's ministers sequestered, but did not seize the park. Consequently, all who chose might chase there. It is likely, on the one hand, that Shakespeare and his friends leapt the little brook in the excitement of following the deer, and so were technically in Lucy's domain, or on the other hand it is equally likely that Lucy, for his own protection, sent

keepers into the "no-man's land" of Fulbrook, and assumed some sort of authority in consequence. We know how Shakespeare would resent this by his action long years after, when, in 1614, he stands forth as the public champion to resist the inclosure of certain common lands at Welcombe and Old Stratford; and in the next year, 1615, we also find in the Stratford archives, a renewed and pre-emptory notice from William Shakespeare, Esq., that "he was not able to bear the inclosing of Welcombe." Further, as to the deer-stealing incident, Lucy was an ardent Puritan, and the Shakespeares were very Broad Churchmen, not at all eager Protestants, spoken of in council, as we have seen, for not going to church regularly; and the Ardens, Shakespeare's mother's family, had been concerned in a conspiracy against the queen, to whom Lucy was warmly devoted. On these accounts, whatever power Lucy had to punish or annoy William Shakespeare, he probably exercised. In the "Merry Wives of Windsor" the poet took a characteristic revenge.

It is on every account to be believed that the real cause is not that given above, but merely the altered circumstances in which the poet had placed himself, as a husband and a father, together with the natural ambition of a young man, which led him to London not very long after his marriage. His journey certainly was made between the spring of 1585 and the autumn of 1587. There, it is said, the author of "Venus and Adonis" obtained a subsistence after the following ingenious fashion:—"Many came on horseback to the play, and when Shakespeare fled to London from the terror of a criminal prosecution, his first expedient was to wait at the door of the playhouse, and hold the horses of those who had no servants, that they might be ready again after the performance. In this office he became so conspicuous for his care and readiness, that in a short time every man as he alighted called for Will Shakespeare, and scarcely any other waiter was trusted with a horse while Will Shakespeare could be had" (Rowe). Other writers mention, with probably greater accuracy, "Shakespeare's boys" as in request for this purpose. The true explanation seems to be that Shakespeare, with that remarkable practical sense which we always find him exercising in business matters, organized a part of the external management of the theatre which before had been very ill managed, and thus succeeded in pleasing patrons and drawing them to the theatre. He had almost certainly written his "Venus and Adonis," perhaps in a fragmentary shape, before he left Stratford. It has been discovered by Mr. Collier, that in 1589, when Shakespeare was only twenty-five, he was a joint proprietor in the Blackfriars Theatre, with a fourth of the other proprietors below him in the list. He had, at twenty-five, a standing in society; he had the means, without doubt, of maintaining his family; as he advanced in the proprietorship of the same theatre, he realized a fortune. How had he been principally occupied from the time he left Stratford, to have become so rapidly a person of importance among his "friends and fellows?" Undoubtedly, by making himself useful to them, beyond all comparison with others, by his writings. It appears highly probable that even before he left Stratford he had attempted some play or plays which had become known to the London players. Thomas Greene, who in 1586 was the fourth on the list of the Blackfriars shareholders, was said to be his fellow-townsmen. But the young poet might have found another and more important friend in the Blackfriars company—for Richard Burbage, the great actor, who in his own day was called "the English Roscius," was also of his county. In a letter of Lord Southampton to Lord Chancellor Ellesmere (written about 1608), introducing Burbage and Shakespeare to the chancellor, it is said:—"They are both of one county, and indeed almost of one town." It is perfectly clear, therefore, that Shakespeare would have received inviting offers to join these men in London, provided he had

manifested any ability which would be useful to them. That ability, we have no doubt, was manifested by the production of original plays (as well as by acting) some time before he had attained the rank and profit of a shareholder in the Blackfriars company.

The old theory that he had not produced any of his dramas till several years after he was a shareholder in the Blackfriars Theatre, is sought to be upheld by the assertion that he is not noticed by any contemporary writer till after the period usually assigned to the commencement of his career as a dramatic author; that is, about 1592. But there is an allusion to "Hamlet" by Nashe in 1589; and the most reasonable belief is, that this was Shakespeare's "Hamlet." Dryden and Rowe also pointed out the following remarkable passage in Spenser's "Thalia" as applying to Shakespeare and that poem was published in 1591.

"And he, the man whom Nature's self had made
To mock himself, and truth to imitate,
Our pleasant Willy, ah! is dead [= silent] of late."

Scolding senility is said to usurp the stage in its whole.

"But that same gentle spirit, from whose pen
Large streams of honey and sweet nectar flow,
Scorning the boldness of such base-born men
Which dare their follies forth so rashly throw,
Doth rather choose to sit in idle cell
Than so himself to mockery to sell."

The most reasonable explanation is, that the players were in Shakespeare's case as anxious as we know they were in others, to keep the plays unprinted as long as they could, so that it should be impossible to enjoy the plays without bringing profit to the theatre. And further, the exquisite taste of Shakespeare would drive him to take every pains before writing out his plays for a final printing. The three plays ("Richard II.," "Richard III.," and "Romeo and Juliet") published in quarto in 1597 were certainly not corrected by him, and probably were surreptitiously obtained. His autograph in Florio's "Montaigne" irresistibly leads us to think that he was studying with Florio in these early years; and Florio was the greatest master of French and Italian of that day, and a *profeta* moreover like Shakespeare himself, of the Lull of Southampton. This sums up accounts for Shakespeare's working knowledge of the two languages.

It is instances of the mention of the poet by his contemporaries during his lifetime be not numerous, we are compensated by the fulness and explicitness of one notice, that of Francis Meres, in his "Palladis Tamia" (1598). Nothing can be more decisive as to the rank which Shakespeare had then taken among the most eminent of the Elizabethan writers. The following is the passage—

"As the Greek tongue is made famous and eloquent by Homer, Hesiod, Euripides, Æschylus, Sophocles, Pindarus, Phocylides, and Aristophanes; and the Latin tongue by Virgil, Ovid, Horace, Silus Italicus, Lucanus, Lucretius, Ausonius, and Claudianus; so the English tongue is mightily enriched, and gorgeously invested in rare ornaments and resplendent habiliments, by Sir Philip Sidney, Spenser, Daniel, Drayton, Warner, Shakespeare, Mulow, and Chapman. As the soul of Euphorbus was thought to live in Pythagoras, so the sweet wittie soul of Ovid lives in mellifluous and hony-tongued Shakespeare; witness his 'Venus and Adonis,' his 'Lucrece,' his sugred sonnets among his private friends, &c. As Plautus and Seneca are accounted the best for comedy and tragedy among the Latines, so Shakespeare, among the English, is the most excellent in both kinds for the stage; for comedy, witness his 'Gentlemen of Verona,' his 'Errors,' his 'Love's Labours Lost,' his 'Love's Labour's Wonne,' his 'Midsummer's Night Dreame,' and his 'Merchant of Venice;' for tragedy his 'Richard the 2d,' 'Richard the 3d,' 'Henry the 4th,' 'King John,' 'Titus Andronicus,' and his 'Romeo and Juliet.' As Epicus Stolo said that the Muses would speake with

Plantus' tongue, if they would speak Latin; so I say that the Muses would speak with Shakespeare's fine filed phrase, if they would speake English."

Shakespeare, however indispensable a protracted residence in London might be to his interests and those of his family, never cast aside the link which bound him to his native town. In 1596 his only son died, and was buried in Stratford. In October, 1598, we find William Shakespeare assessed on property in St. Helen's parish, Bishopsgate, in the city of London; while the year before, in 1597, he purchased the Great House at Stratford, then reckoned one of the best houses in the place, and at the time of Shakespeare's purchase known as New Place. Shakespeare at once took the position of a great man in Stratford affairs. There were rumours of a scarcity in corn, and holdings were inquired into, in 1598—when it appeared that only two citizens held more corn than Master William Shakespeare. He was consulted on important affairs, and asked for help, as local dignitaries are, on many occasions. The alderman writes to beg him to buy land at Shottory to aid in public improvements. When he dies his tablet and bust occupy the most important place in the church. Evidently he stood very high in the respect of his townsmen.

Shakespeare added to his Stratford estate by several purchases, and in the year 1602 acquired 107 acres of arable land and 20 acres of pasture land. In 1605 he possessed 137 acres altogether, a fine house or mansion, with a handsome garden, and a cottage or lodge also with a garden; and in this year also he bought a moiety of a lease of the tithes in Stratford with thirty-one years yet to run, worth £60, equal to over £350 in our present value yearly. The wealth enabling him to do this he earned by his share in the theatre profits in London. In 1595 he held a much more important rank as a partner in the Blackfriars Theatre than in 1589; and the Globe Theatre also belonged to the body of proprietors of whom he was one. Finally, in March, 1613, we have a deed giving us two of the five signatures of the poet) and had also a mortgage, but that is now lost, which shows that he had acquired a house and piece of ground near the Blackfriars Theatre, not far from St. Paul's Cathedral. That this was merely an investment, perhaps to assist his theatrical property, is shown by the fact that he let it at once for ten years. There is no doubt he never meant to return to London, except for business visits, after 1604.

Turning back to the last year or two of the sixteenth century and the opening years of the seventeenth, we find the poet for the most part in London. In 1601 his father died, and his burial is registered at Stratford. Shakespeare appears then to have had three brothers living—Gilbert, Richard, and Edmund—and one sister, Joan. (One of the children about of before he was born was also called Joan.) In 1603 James I. ascended the throne of England. Shakespeare's patron, Lord Southampton, who had so prominently participated in the conspiracy of Essex, was a favourite of the new king; and one of the first acts of the reign was a grant of a patent to the proprietors of the Blackfriars and Globe theatres. In this patent ("Pro Laurence Fletcher et Willmo Shakespeare et alijs) the name of Shakespeare stands the second, the names mentioned being "Laurence Fletcher, William Shakespeare, Richard Burbage, Augustine Phillipps, John Hemmings, Herrie Condel, William Sly, Robert Armin, Richard Cowly, and the rest of their associates." Soon after this period it is believed that Shakespeare retired from the exercise of his profession as an actor. But he continued to hold his property in the theatre. In 1608 the corporation of London attempted to interfere with the actors of the Blackfriars; and there being little chance of ejecting them despotically, a negotiation was set on foot for the purchase of their property. A document found by Mr. Collier among the

Egerton papers at once determines his position in regard to his theatrical proprietorship. It is a valuation, containing the following item:—

"Item. W. Shakespeare asketh for the wardrobe and properties of the same playhouse £500, and for his four shares, the same as his fellows Burbidge and Fletcher, viz., £933 6s. 8d. 1433 6 8."

We may now suppose that the great poet, honoured and esteemed, had retired permanently to Stratford, retaining a property in the theatre—regularly writing for it. But the years from 1604 to his death, in the April of 1616, were not idly spent. He was a practical farmer, there is little doubt; and it seems also certain that he continued to write till he was removed by death; and that the Roman plays were intended as the beginning of a series.

In 1607 Susanna, Shakespeare's eldest daughter, married a physician resident at Stratford—a man of high professional repute, Dr. Hall. In 1608 (the same year that his mother died) his granddaughter Elizabeth was born. To this child he bequeathed a sum of money and all his plate, "except my broad silver and gilt bowl." Shakespeare was thus a grandfather at forty-three.

Shakespeare's death was due to the want of sanitary precautions in his town. Close along his wall were offices of an unsanitary nature, due to the carelessness of neighbours, and we know that attempts were made to remove the nuisance. It may be regarded as certain that the attack of fever to which the great poet succumbed after three days' illness was due to this "enemy at the gates," and not, as scandal would have it, to the fatigues of a drinking bout with old London associates. Shakespeare's wife, Ann Hathaway, survived him, dying in 1623. His granddaughter, Elizabeth Hall, married first Thomas Nash of Stratford, who died in 1647—secondly, in 1649, Sir John Barnard of Abington. She had no children. As the children of Shakespeare's daughter Judith (Mrs. Quiney) all died young, the poet's family became extinct on Lady Barnard's death in 1670.

Tradition says that Shakespeare died on his birthday, 23rd April; this as yet rests on no actual evidence, but by the register of Stratford he was buried on the 25th of April, 1616. He had survived the marriage of his daughter Judith to Thomas Quiney only two months, and he made his will probably upon the occasion of that marriage. It is dated 25th March, 1616, but in the document February has been first written, and afterwards struck out. By this will, which is long, he gives his real estates to his eldest daughter. According to a frequent interpretation of his will, he treats his wife with neglect and "bitter sarcasm," for which estranged affections would have been no warranty; and consigns her, with a solemn avowal of contempt and hatred, to a miserable dependence, not even recommended or implied, upon the bounty of their common children. According to the dictum of Malone he "cut her off, not indeed with a shilling, but with an old bed." This is sheer absurdity. It was, indeed, the poet's object by this will to perpetuate a family estate. His estates, with the exception of a copyhold tenement, expressly mentioned in his will, were freehold. His wife was entitled to dower. She was provided for amply by the clear and undeniable operation of the English law. Probably the second best bed which he bequeaths her is a mark of tender affection, not of studied slight. The best bed would be part of the furniture of prosperous days, and an heirloom, almost to a certainty, rarely used, and ornamenting the guest-chamber, according to the custom of the day; while the second best bed was in all probability the couch of the days of adversity, if not the wedding bed itself.

The spelling of Shakespeare's name is not well settled. The following are all his known signatures:—1, From the

deed of bargain and sale (bought by Corporation of City of London, 1841, for £145); 2, from the first edition of Florio's translation of Montaigne's Essays (bought by British Museum, 1838, for £100); 3, from a mortgage deed now lost (fac-simile by Malone); and 4, 5, 6—given below—from the three sheets of the will.

Will, 1st page.

William Shakespeare

Will, 2nd page.

William Shakespeare

Will, 3rd page.

William Shakespeare

These would appear to point to *Shakspeare* as the poet's own spelling, but the printed plays published during Shakespeare's life *always* adopt the spelling *Shakespeare*. And it is observable that in one signature to the will, and in Malone's fac-simile and the signature to the deed, an *a* is apparently introduced either in the writing or above it in the second syllable. Spelling was by no means settled in the poet's time; his own son-in-law spelt his name indifferently, Quiney, Quyne, Quyne, and Conoy, and the great Raleigh sometimes got as far abroad in his signature as "Wrawlegh." In an audit office record of expenses of the Master of the Revels for 1601 and 1605, we find, "On St. Stephen's night, Mesur for Mesur, by Shaxberd, perfd. by the K.'s players; on Innocents' night, Errors, by Shaxberd, perfd. by the K.'s players; on Shrove Sunday, the Marchant of Venis, by Shaxberd," and so on. This seems very wide till we trace old Stratford registers, where "Shaxber" and "Shaxbeere" are not at all uncommon variants of the name.

Save the signatures mentioned above there is not a scrap of Shakespeare's writing now known.

As for Shakespeare's personal appearance, the only authentic memorials are a mask, said to have been taken from the poet's face after death, the bust over the memorial tablet at Stratford, and four portraits.

The Stratford bust (see next page) by Gerard Johnson, was a contemporary work; for we have Digges's lines prefixed to the first edition of Shakespeare in 1623—

"Shakespeare, at length thy pious fellows give
The world thy works: thy works, by which outlive
Thy tomb thy name must: when that stone is rent,
And time dissolves thy Stratford monument,
Here we alive shall view thee still," &c.

The bust is of stone, the size of life, and was originally painted. The hands and face were in light flesh colour, the eyes hazel, the hair and beard auburn; the coat was scarlet and the mantle black. The cushion on which the poet's elbows rested was green and crimson, with gilt tassels. In 1748 the colours were carefully restored, having faded a good deal by time, the restorer being John Ward, Kenble's grandfather. In 1793, most unhappily, Malone was permitted to paint it with white paint so thickly as to disturb the expression, as we are told by several accurate critics of the time.

The mask, which has the date 1616 scratched on it, was long in the possession of Count Von Kesselstadt, and now belongs to the family of Dr. Becker, chaplain to the late Princess Alice of England, Grand-Duchess of Hesse. It shows a finely-shaped, thin, and almost haggard visage. The theory is that the Stratford bust was carved from

it, the artist filling in the fulness of health from his own memory, and perhaps overdoing it.

Of the portraits the best authenticated is that by Martin Droeshout, a vignette print, prefixed to the 1623 folio. It is closely similar to the Stratford bust; and is, like it, deficient in all high qualities of art. Both, however, strike one as faithful attempts at delineation. The engraving by Marshall, prefixed to the 1640 folio edition, impresses one as being imitated from Droeshout and the bust. The Droeshout woodcut, it is important to note, was approved by Shakespeare's colleagues and

friends. The following lines by Ben Jonson accompany it:—

"This figure that thou here seest put
It was for gentle Shakespeare cut;
Wherein the graver has a stile
With nature to outdo the life.
Oh, could he but have drawn his wit
As well in brass, as he had hit
His face, the print would then surpasse
All that was ever writ in brass
But since he cannot, Reader, look
Not on his picture but his book."

The fine "Chandos" portrait, as it is called, was given by the Earl of Ellesmere to the National Portrait Gallery at South Kensington. The earl bought it of the trustees of the Duke of Buckingham and Chandos. The first known of it is that it belonged to Davenant half a century after the poet's death, then it went to Betterton the actor. Kneller copied it for Dryden. It is well traced into the Chandos family, for it has often been engraved, and is, in fact, the origin of the popular conception of Shakespeare's face. Rowe prefixed an engraving of it to his edition. (Closely akin to the Chandos portrait is that by Cornelius Jansen, now in the collection of the Duke of Somerset.) Much as we must admire the beauty of the Chandos portrait as a work of art, and its superior likelihood of being the portrait of a consummate genius—the forehead lofty, the face delicately oval, the features handsome, the expression deeply thoughtful—yet the fuller face, the comfortable well-to-do expression, the jaunty moustache and slight tuft of beard, the clean-shaven full cheeks, and the bald crown of the Stratford bust and the Droeshout engraving must on the present evidence outweigh all the charm of the more ideal painting. Nevertheless our readers will be richly rewarded by a visit to the famous picture.

A consideration of the characteristics of the stupendous genius of Shakespeare, an investigation of the wide difference between him and other poets of the very highest rank, and a criticism and classing of his immortal dramas, are themes equally important, but equally foreign to the scope of this work. On the other hand it is manifestly necessary to follow the record of the poet's career with a brief account of what one may call the externals of his works: that is to say, the conditions of their origin and performance, and their approximate chronology.

Shakespeare entered upon his art not only endowed with the most colossal literary and poetic genius the world has seen, but among a set of conditions never before found, save only in the age of Periklès. The forms of poetry were young, all minds were fresh, the nation was newly awakened from the centuries' sleep of scholasticism; the time is rightly named the *Renaissance*, the new birth. Our little insular nation was springing with mighty bounds to the leading place in Europe, resisting Spain and France, aiding Holland—nothing was so adventurous but that English heroes dare not attempt it. It was an Englishman (Cabot) who discovered the mainland of America; Drake who sailed round the world; Raleigh who brought home the potato and tobacco. Men's minds were aflame, every day brought a marvel, their imaginations needed no kindling, somewhat



Monument in Stratford Church.

of poetry mingled with daily life. Such an audience were quick to feel with the poet, and the slightest hint was enough to supply the stage conditions. Before this enthusiastic, curious public, eager to receive anything good, the poet produced his play, making his form and style for himself—nothing as yet crystallized, nothing slavishly based upon approved models, but all pregnant with life and development, every year making some advance. The first theatre (called *The Theatre*) was not built till as late as 1576, when Shakespeare was twelve; and the famous Blackfriars did not exist till twenty years later. The classical culture of the Renaissance supplied the element of refinement, the coarse and boisterous "moralities" and "moral plays" of the preceding generation supplied the element of national humour; it was the happy fortune of the Elizabethan dramatists to combine the two into an immortal whole, vivifying the dead and subduing the over-vitality of the living.

Antiquaries have realized the stage details of Shakespeare's time till we feel as if we had but to cross the river Thames and walk along Bankside to find the hexagon-shaped Globe as it was when Shakespeare played in it, with its flag flying from the roof, its beating drums and trumpets sounding the hour of the performance. The low, square building, open to the slanting sunlight, built of shabby wood, not unlike a circus, smelling of sawdust and the breath of the people, opens before us; we watch the crowd of "groundlings," the spectators in the twopenny room overhead, the inmates of the boxes, the gallants on their stools upon the stage, and the rush-strewn stage itself, sheltered by its tiled roof or "heaven," and backed perhaps by a battlemented pasteboard wall with a placard upon it to say that "this is Rome." It is a scene which

has been often described. The influence of the stage conditions upon plays and actors was all for good. Owing to the simplicity of the whole stage-mounting, attention was concentrated on the actors, with whose movements, boldly defined against a simple background, nothing interfered. The stage upon which they played was narrow, projecting into the yard, surrounded on all sides by spectators. Their action was thus brought into prominent relief, placed close before the eye, deprived of all perspective. It acquired a special kind of realism, which the vast distances and manifold artifices of our modern theatres have rendered unattainable. This was the realism of an actual event, at which the audience assisted; not the realism of a scene to which the audience is transported by the painter's skill and in which the actor plays a somewhat subordinate part. It resulted from these circumstances that the language of the dramatist and the personality of the actor were all important. A naked action was presented by the player to the audience. That naked action had to be assisted by the playwright's poetry, and much that now seems superfluous in the descriptive passages of the Elizabethan tragedies was needed to excite imagination. One feature of the stage of Shakespeare's day must be especially noted, as without it much of Shakespeare's stage action is obscure. There was always a raised stage at the rear

of the general stage, and the former served for the battlements of a town, for a second room, for the camp of an army different to that which occupied the lower stage, for a balcony, &c., so that it was the easiest thing possible to do as Shakespeare is so fond of doing, conduct two actions at the same moment. The origin of this is to be explained in a sentence. The earliest dramas were performed in an inn yard, and this rearward upper-stage was simply a bit of the first floor gallery which surrounded the whole yard and gave access to the bedrooms.

Shakespeare's plays fall naturally of themselves into four groups, and it is found that these correspond with four periods of his life. The first period runs from 1587 to 1594; the second runs on to 1600; the third finishes when he left London entirely for Stratford, in 1608; and the fourth includes the three great dramas written after the poet had permanently settled at Stratford. Of these, the third is the grand period, the period of splendour.

The first period comprises the poet's early dramatic attempts, largely consisting of retouchings of standard plays, and quite dominated by the literary tendencies of the time. Four tragedies, the three "Henry VI." plays, and "Titus Andronicus," and four comedies, "Love's Labour's Lost," the "Comedy of Errors," the "Taming of the Shrew," and the "Two Gentlemen of Verona," must be set down here. We know also that the first seventeen sonnets were made, and that "All's Well that Ends Well" was written in its first form of "Love's Labour's Won," "Hamlet" was briefly sketched, and "Romeo" more thoroughly worked upon. These studies, and careful practical work, concluded with the magnificent burst of genius called "Richard III.," and this concludes the first period.

PLAYS OF FIRST PERIOD.

	Supposed Date.	Earliest Allusion.	Published.
Titus Andronicus (touché up),	1588 ...	1594 ...	1600
Love's Labour's Lost,	1589 ...	1598 ...	1598
Love's Labour's Won (All's Well),	1589 ...	— ...	—
Comedy of Errors,	1591 ...	1594 ...	1623
Taming of the Shrew,	1592 ...	— ...	1623
Two Gentlemen of Verona, . .	1590-2 ...	1598 ...	1623
Henry VI. (three plays), . . .	1590-2 ...	1592-5 ...	1623
Richard III.,	1593-4 ...	1595 ...	1597

The second period shows Shakespeare free from all trammels, carving out his own grand path for himself. Here his thought does not as yet weigh so heavy as his words; he has complete command of his art, and has not yet soared beyond the ordinary powers of language. Consequently for faultless lines, easy flow, spirited action, and pure style, we look chiefly to these plays. There is a splendid historical series: "Richard II.," "Henry IV." (two plays), "Henry V.," and "John," a beautiful love-tragedy "Romeo and Juliet," and two noble groups of comedies: (1) "Midsummer Night's Dream," "All's Well that Ends Well," and the "Merchant of Venice;" and (2) "Merry Wives of Windsor," "Much Ado about Nothing," "As you Like it," and "Twelfth Night." As to the "Merry Wives" tradition says that Queen Elizabeth commanded it, as she had been so amused with Falstaff in "Henry IV.," that she desired to see him in love, and with her usual impetuosity she ordered the poet to be ready with the new play in fourteen days.

PLAYS OF SECOND PERIOD.

	Supposed Date.	Earliest Allusion.	Published.
Richard II.,	1594 ...	1595 ...	1597
Midsummer Night's Dream, . .	1594 ...	1598 ...	1600
All's Well that Ends Well, . . .	1594 ...	1598 ...	1623
(Rewritten from Love's Labour's Won).			
Merchant of Venice,	1594 ...	1598 ...	1600
Romeo and Juliet,	1595 ...	1595 ...	1597
John,	1596 ...	1598 ...	1623
Henry IV. (part I.),	1597 ...	1598 ...	1598
Henry V.,	1597 ...	1599 ...	1600
Henry IV. (part II.),	1598 ...	1598 ...	1600
Merry Wives of Windsor, . . .	1598 ...	1602 ...	1602
As You Like it,	1599 ...	1600 ...	1623
Much Ado about Nothing, . . .	1600 ...	1600 ...	1600
Twelfth Night,	1600 ...	1602 ...	1623

The glorious third period of Shakespeare, the culmination of the dramatic art of the whole world, gave us those wondrous representations of humanity, with its force and its feebleness, its good and its evil, which constitute among themselves an epitome of life. All this consummate work and wealth of outpoured wisdom must, by good evidence, be attributed to not more than eight years' space; that is, if we speak of only its actual production—for in one case ("Hamlet") we are aware that the play was the work of a

lifetime, taken up now and again and lovingly touched and re-touched. The unrivalled tragedies of the third period are "Hamlet," "Othello," "Macbeth," and "Lear;" then come the splendid Roman plays "Julius Caesar," "Antony and Cleopatra," "Coriolanus;" two Greek plays (as curiously non-Greek in everything but name, as the Roman plays are marvellously Roman in all essentials), "Troilus and Cressida," and "Timon of Athens;" and a comedy in form, but an intense tragedy by its meaning and painful story, "Measure for Measure." The consummate representation of the evils that afflict mankind, especially the evils of our own making, causes us to shudder at the power of these dramas which set it forth; but side by side with the elemental forces of evil, Shakespeare shows us, deep lying in the human heart, unlimited possibilities of good: the power of love and virtue is set forth in as splendid guise as the power of hate and wickedness. It is the awful truth with which the eternal conflict between these powers is put before us that makes these plays so fascinating to the thoughtful mind, and causes them to be the more interesting the more thought is expended upon their study. To study "Hamlet" or "Macbeth" is to study life itself, with the inestimable advantage of having the facts isolated and arranged from the general turmoil of the world. The keen observer detects that in tragedy Shakespeare does not depict "a good man struggling with an adverse fate," after the manner of the ancients, but rather a noble mind gradually degenerating through some fatal original error or sin, a Macbeth, a Lear, or an Othello—which, if we consider it, is a far more tragic thing. A Sophocles shows the ruin of a life, overweighted by fate, as the basis of the tragic art; Shakespeare shows the ruin of a soul, dragged down by its own wicked act. So wonderful was Shakespeare's power of observation, that it is only after 300 years, with all their gathered experience, that we can understand "Hamlet" clearly. This is simply to say that Shakespeare was three centuries in front of contemporary minds.

PLAYS OF THE THIRD PERIOD.

	Supposed Date.	Earliest Allusion.	Published.
Hamlet,	1601 ...	1602 ...	1602
Julius Caesar,	1601 ...	1601 ...	1623
Measure for Measure,	1603 ...	1604 ...	1623
Othello,	1604 ...	1604 ...	1622
Macbeth,	1605 ...	1610 ...	1623
Lear,	1606 ...	1606 ...	1608
Troilus and Cressida,	1606 ...	1609 ...	1609
Antony and Cleopatra,	1607 ...	1608 ...	1623
Coriolanus,	1607 ...	— ...	1623
Timon (put),	1608 ...	— ...	1623

Shakespeare probably never visited London after 1612, and may be said to have left it for good in 1608. The three great dramas of the fourth period, "Cymbeline," "A Winter's Tale," and "The Tempest," seem to show us why he did so. The calm which pervades them, the greater force given to enduring virtue, the more contemplative view of life, indicate that the poet had passed through the region of storms and reached clear water beyond. "The Tempest" is always held to be Shakespeare's last work, and if so, Prospero's breaking of his magic wand has a twofold meaning.

PLAYS OF THE FOURTH PERIOD.

	Supposed Date.	Earliest Allusion.	Published.
Pericles (part),	1608 ...	1608 ...	1609
Cymbeline,	1609 ...	— ...	1623
Winter's Tale,	1611 ...	1611 ...	1623
Tempest,	1611 ...	1611 ...	1623
Two Noble Kinsmen,	1612 ...	— ...	1634
Henry VIII. (part),	1613 ...	1613 ...	1623

"The Two Noble Kinsmen" was published in 1634 as by Shakespeare and Fletcher, and assuredly there are lines in it which no one but Shakespeare may claim. As a whole it is probably not Shakespeare's. The exactly reverse decision is usually given as to "Henry VIII." As a whole it is Shakespeare's, but there are many scenes certainly not by him. It would seem to be a play partly written by Shakespeare either now or at some earlier date, partly finished by Fletcher, and finished altogether by Massinger. Massinger's part is considered to be i. 1, iv. 1, v. 1, and parts of other scenes. The undoubted Shakespeare scenes are i. 2, ii. 3, iii. 1, among others. The patchwork character of the play is shown by a very simple illustration. In i. 1 (Massinger) are mentioned (1) Michael Hopkins, a monk of the Chartreux; (2) John de la Cur, the duke's confessor; (3) one Gilbert Peck, his eccaneller. In i. 2 (Shakespeare) these become (1) Nicholas Henten, a Chartreux friar, his confessor; (2) John de la Cur, his chaplain; (3) not mentioned. In ii. 1 (Fletcher) they are again changed to (1) Devil Monk Hopkins; (2) John Car, his confessor; (3) Sir Gilbert Peck, his chancellor. It is impossible that any single author should have thus varied in so short a space. Critical considerations have led to 1166 lines being credited to Shakespeare, and 1761 to Fletcher and Massinger. This is Mr. James Spedden's computation, with which others agree tolerably well. "Henry VIII." was the play being acted when the Globe Theatre was burnt down in 1613, the fire being caused by the discharge of chambers in act i. scene 4.

The original editions of Shakespeare's plays are the following—

1. The quarto copies of single plays, dating from 1597 to 1622.

2. The folio of 1623 by Heminge and Condell, Shakespeare's colleagues and partners at Blackfriars. "Mr. William Shakespeare's Comedies, Histories, and Tragedies, published according to the True Originall Copies" (8th November, 1623). . . . "so many of the sud copies as are not formerly entered to other men," i.e. the quartos. To these two men and Burbage, the greatest actor of them all, Shakespeare left 26s 8d., worth about £12 in our money, "to buy them rings." (Burbage died in 1619, or no doubt he would have taken part in the publication.) The edition was dedicated to the Lords of Pembroke and Montgomery. A most interesting notice from the poet's 'followers' tells us, among other things, that "what he thought, he uttered with that easiness that we have scarce received from him a blot in his papers." Ben Jonson adds a glowing eulogium in poetry "to the Memory of my Beloved, the Author, Mr. William Shakespeare." No less than eighteen plays were first printed in this edition, which alone preserved them to us, before the dark days of Puritan tyranny swept away the drama in such ruthless way that it has never since recovered in its former spirit. Four other plays were also here first printed in a perfect state. There were thirty-six plays in this edition altogether. The folio was reissued in 1632, 1644, and 1680, but without any difference of merit.

The original critical editions are the following:—Rowe's, in 1709, with a life (second edition, 1714). Pope's, in 1725, in six vols., quarto, with a masterly preface, and that full sympathy with the author in the critical remarks which was to be expected from so great a poet (second edit., 1728). Pope was not truly fitted for an editor, and several bad editorial blunders were exposed by Theobald in 1726, drawing down one of Pope's scathing outbursts of satire. Theobald, put on his mettle, produced a far better edition than Pope's in 1733, seven vols. 8vo, which quite replaced Pope's in public favour, and ran through many editions. Hunter (1744) and Warburton (1747) followed, at brief intervals, with editions quite useless for critical purposes. Dr. Johnson's edition, which was what is called a *variorum*

edition (that is, one which collects and sums up all the opinions of preceding commentators), appeared in 1765 in eight vols. 8vo, preceded by a preface in Johnson's very best style, so clever, so fair-seeming, and so convincing that it ruined Shakespeare-criticism for a time, for it is hardly necessary to say that the great and good doctor did not understand Shakespeare, and the finer his criticism was as a literary effort the greater harm it did as a critical guide. One sentence will serve as a sample:—"He has scenes of undoubted and perpetual excellence, but perhaps not one play which, if it were now exhibited as the work of a contemporary writer, would be heard to the conclusion." It seems incredible that the cultured Johnson could so write. Capell, the first editor to study Elizabethan literature and really elucidate his author in true editorial wise, brought out an edition which was an excellent beginning in this style, in 1768. Steevens, with Johnson's name added to his own as editor, produced editions in 1773 and 1778. Malone's familiar (*variorum*) edition appeared in 1790. Steevens returned to the work in 1793, and brought out that edition which has excited the wrath of Shakespeare-lovers ever since, wherein he audaciously set to work to amend the text, chopping off a word here and adding one there, to make it read more smoothly! For nearly half a century, although Malone tried to recall the public to the true text in his edition of 1821, Steevens' impertinent corrections represented Shakespeare to the general public. Of what may be termed contemporary editions those of Charles Knight, Dyce, Payne Collier, Staunton, Halliwell, and above all of Clarke and Wright (the Cambridge editors), may be mentioned as the best. Fine but costly *variorum* editions of the chief plays appeared one by one from the hands of H. H. Furness, of Philadelphia, America, during the close of the present century. "Othello," completing the five great acted tragedies, appeared in 1886. The famous Bowdler family edition (in which Mr. Bowdler suppressed all the naughty words, ruined the sense, and gave a new verb, "to bowdlerize," to the English language) appeared in 1811, and has been the critic's laughing-stock ever since. Its production was well-intentioned, however; Bowdler, a genuine lover of Shakespeare, had reason to fear that some over-patular persons were afraid of the occasional coarseness of Shakespeare, and were debarred from the enjoyment of his treasures. With the best meaning in the world, therefore, he perpetrated his gigantic literary crime.

The criticisms of Lamb and Coleridge, those of Lessing, Goethe, Schlegel, Gervinus, and Ulrich in Germany, and the excellent critical labours of Furnivall and Fleay in our own day, complete the list of those with whose productions it is necessary for the Shakespearian student to be acquainted.

The poems and sonnets of Shakespeare are unjustly overshadowed by his magnificent dramas, but every year brings more students to them. The "Venus and Adonis" was printed in 1593, the "Lucrece" in 1594, and both are dedicated to the Earl of Southampton. The publication of the first at once set Shakespeare in the rank of admired poets. Its passionate fervour, and its wealth of imagery and truth to nature made it a universal favourite, and it was constantly reprinted, though now it seems to us but a boyish wonder, standing, as we do, upon the heights the poet afterwards attained. What is so exceedingly curious about both these poems is the studious avoidance of the dramatic. For example, in "Venus and Adonis" the boar hunt is actually omitted, and narratives and long soliloquies make up the poem. The cause of this is not any early aversion to dramatic effects, but simply that Shakespeare was working in a favourite style of the period; he succeeded, it is true, better than any one else, but he flung it aside when he had proved its falseness, never to resume it.

As regards the sonnets Wordsworth says, "With this key Shakespeare unlocked his heart"—a dictum entirely

and indignantly repudiated, with the words "If so the less Shakespeare he," by Robert Browning. And yet the riddle remains—What means this large collection of 154 splendid poems, a majority of which are connected? Meres speaks of "Shakespeare's sugared sonnets among his private friends," and the question is how far they were "sugared," how far true memorials of the experiences of a somewhat sad life? The vividness of many of them, "The Dyer's Hand" (ex.), for instance, renders it quite impossible to regard them as mere fictions, but in many others we seem to see a sort of allegory or veiled story told. A hundred and twenty-six sonnets are addressed apparently to a young friend whom the poet loved so deeply that when his mistress was seduced by him, even that treachery could not shake his love. Twenty-six more are addressed to a dark lady, the mistress aforesaid. Had this tale been actually true, and had the lady been Mistress Mary Fitton, one of the queen's maids of honour, and the friend William Herbert, earl of Pembroke ("W. H., the onlie begetter of these insuing sonnets"), as seems likely to many critics, surely we must have come against the traces of such a scandal in the works or letters of the gossips of the time. Probably, therefore, the poet, wantonly and for the sake of art, exaggerated sentiments that had some basis, but ran by no means the extent that he chooses to make them. Certainly Mrs. (as we should now say "Miss") Fitton was at one time the Earl of Pembroke's mistress, and we would give much to know the colour of her hair. But let the riddle be solved how it may, Shakespeare's sonnets contain some of the most beautiful and striking passages in our poetical literature.

SHAKESPEARE-BACON THEORY. The theory that William Shakespeare did not write the works published under his name originated in several minds independently. Horace Walpole casually suggested the doubt in his "Historic Inquiries." Mr. Jameson wrote an article in *Chambers's Journal*, August, 1852, entitled "Who wrote Shakespeare?" raising the doubt, but leaving it unsettled. Miss Delia Bacon in America, and Mr. W. H. Smith in England, in 1856, about the same time, put forth Lord Bacon's claims. Later, about 1866, Mrs. Pott, knowing nothing of previous inquiries, reached the same conclusion. The most complete statement of the argument, as a whole, is contained in Judge Holmes' "The Authorship of Shakespeare," in two 8vo vols. Mr. Appleton Morgan's book, "The Shakespeare Myth," which appeared in 1881, is a clever plea for the anti-Shakespeare side, rather than pro-Baconian. He has published minor articles, one of the most notable being a paper in *Manhattan*, May, 1884, on the Sonnets. Another independent discoverer, Dr. William Thomson of Melbourne, has written several works. His writings began in 1878, and continued till 1883; they are strongly Baconian, and endeavour to trace political purposes in the plays. The most important single work is Bacon's "Promus," with annotations, prefaces, and appendices, by Mrs. Henry Pott, and an introduction by Dr. Abbott (1883). The "Promus" is a large collection (about 1655) of various notes, Scripture texts, mottoes from classic writers, proverbs in various languages, turns of expression, specimens of repartee, &c. Mr. Spedding could not, he tells us, quite make them out, and accordingly only published about 300, with a general description of the whole. Mrs. Pott finds in them hints for invention, which, she says, were used in the construction of Shakespeare, and publishes the entire collection with passages from the plays and poems which she has found more or less clearly reflected in the "Promus" entries. In the appendix, besides other materials, is a list of 6000 works examined belonging to the Elizabethan age, in order to prove the negative and somewhat illimitable thesis, that the "Promus" notes cannot, to any appreciable extent, be connected with other writers. Mrs. Pott has since published as pamphlets two instalments of a larger work, entitled "Did Francis Bacon write Shake-

speare?" The first contains a summary, under thirty-two headings, of the reasons for thinking that he did. The second is a comparative view of the contrasted lives of Shakespeare and Bacon, to show how far the theory is borne out by Bacon's personal history. Mrs. Pott's aim is by minute and comprehensive criticism to prove that all the knowledge and beliefs, including errors and mistakes, that are to be found in Bacon's prose, are to be found in Shakespeare: that the mental inventory of the two is identical; that the law, horticulture, natural history, medicine of Bacon, his peculiar notions about the human body and the "sensitive soul," his ideas about sound, light, heat, cold, germination, maturation, putrefaction, the winds, astronomy, astrology, witchcraft; his biblical preferences, superstitions, and church opinions; his favourite books and heroes; his characteristic aphorisms, vocabulary, metaphors, turns of expression, are all in Shakespeare; that much that might be expected from a Midland countryman is not present, while an aristocratic familiarity with upper-class life and general avoidance of middle-class persons and pursuits points to the author as a courtier and an aristocrat. Mrs. Pott's researches differ from those of the other writers named, in being more statistical and systematic. All alike seek to show by parallelisms that the mind of Bacon is reflected in Shakespeare that identity of authorship must be inferred. The negative side is supplied by all that is known authentically about William Shakespeare. The Baconian challenge Shakespeareans to point to any single passage in Shakespeare which becomes more interesting and intelligible by collation with anything known about Shakespeare himself. And they point to the 1623 folio, published seven years after Shakespeare's death, when Bacon, by his fall, had gained literary leisure.

plays before he of, eighteen never before published, and large additions or alterations in the rest, as quite irreconcilable with the reputed authorship. It is also urged that Bacon was addressed by a friend as "the greatest wit of his age," although known by another name, and that he speaks of himself as a "concealed poet." That Bacon should have resigned himself to seeing his own plays and poems attributed to a popular player is explained by the assumption that his main ambition was to achieve a scientific and philosophic reputation, and secondary to this to gain influence as a statesman and a courtier, and that play writing was regarded as a derogatory pursuit unworthy of a philosopher or a statesman. No attempt has been made by any accredited Shakespearean student to reply to the arguments of the Baconians. Dr. Furnivall calls it "infinite tomfoolery," and the like contemptuous language has been used on all sides; but the progress which the theory has made in recent years justifies this short notice of its origin and growth. The ablest exponent of the theory in England is Mrs. Henry Pott. Her brother, Mr. Francis Pardon, and Dr. R. M. Theobald of Blackheath, are also known as its able and earnest defenders. A Bacon society was formed in 1886, with the object of studying Bacon's works and all questions associated with him. Its attitude is friendly to the Bacon-Shakespeare theory, but it does not commit its members either to the one side or the other.

SHALE (Ger. *schalen*, to peel off) is a rock consisting of hardened mud or clay, and readily splitting into thin even layers along the lines of bedding. The peculiar fissile character is technically spoken of as *lamination* (lit. *lamina*, a thin plate). Closely allied rocks are *Mud-stone*, having an earthy and almost homogeneous texture, and *Marl*, containing a large admixture of carbonate of lime.

SHALLOON, a light worsted short napped cloth which derives its name from Chabons, in France, where it was first manufactured (*cras de Chabons*).

SHALLOT. See **ALLIUM**.

SHALM (or *Shalum*) an ancient instrument of music. The Prayer Book use of the word to translate a certain

Hebrew instrument mentioned in the Bible is quite incorrect. Thus the shawm of Psalm xlviii. 7 (Prayer Book translation) is the *shofar*, which is a trumpet made of a ram's horn, as used in the synagogues on Jewish New Year's Day from time immemorial down to the present. Therefore the old translation, "With trumpets also and shawms," was very properly altered in the Authorized Version to "With trumpets and sound of cornet," and is so retained in the Revised Version.

The shalm is a sort of small oboe, a pipe with a reed in the mouth-hole, the reed being protected by a cover having an orifice at the top, through which the instrument was blown. The name was derived from Lat. *calamus* (a reed), and the French name *chalumeau* and the German name *schalmey* are also merely other modifications of the same root. This gives some colour to a theory often broached that the Romans introduced the pipe into Western Europe. The present Tyrolean *schalmey* and Italian *pipera pastorale* are descendants of the old shalm, and possibly are not much modified; the first still retains the characteristic box. It has six holes, played by the middle fingers of each hand, and a seventh hole (with a key) for one little finger.

SHAM'ANISM, in a wide sense, is the name given to all spirit worship connected with magic arts, but commonly only that of the north Asiatic races. The name is a corruption of the Sanskrit *Shramana*, a Buddhist ascetic or mendicant. Shamanism is one of the earliest phases of religious art, in its nat with in various forms among all the savage races of the world. It is akin to or a mixture of fetishism, or the adoration of magic stones and trees, and other material objects considered as abodes of spirits, and shamanism, or the worship of the stars. Shamanic priests affect to be in the secret of controlling the coming and departing of evil spirits. Casteln says they are practised in a kind of cunning tricks by which they know how to dazzle the simple crowd and inspire greater trust in themselves. Their offices are generally called into requisition in cases of sickness or death, which most rude peoples ascribe to the presence or ill-will of demons. In Siberia the priest usually sucks the part of the body of the patient which aches the most, and finally takes out of his mouth either a thorn, a bug, a stone, or some other object, which he exhibits as the cause of the complaint. The process is sometimes accompanied with beating of drums and blowing of horns, while the priest works himself into a state of trance and epilepsy. Similar practices are recorded in the Vedic literature of the Hindus, and the historical extension of Shamanism among the tribes of Northern Asia runs parallel with the spread of Buddhism. It appears also that some of the ancient religious schisms among the Iranians were due to the prevalence of Shamanism. Until the reign of Genghis Khan the Mongols were almost wholly given to Shamanism and sorcery; but subsequently many of them passed over to Islamism which is in vogue also a kind of Shamanism intermingled with Buddhistic doctrines.

SHAM ROCK is the name of a plant, the national emblem of Ireland, as the rose is of England, and the thistle of Scotland. It is a curious fact that botanists are not yet agreed as to what is the true species known by this name. The doubt seems to have arisen in the use of the Celtic word for this plant, which indicates a so-called three leaved form (trifol). Thus, many hold that the shamrock is the White Clover (*Trifolium repens*), while others regard it as a name for the common Wood Sorrel (*Oxalis acetosella*), which is a native of the British Isles. The former view is most likely the true one, but perhaps no distinct species is intended to be pointed out beyond a plant with trifoliate leaves. The story goes that St. Patrick, the great patron saint of Ireland, made use of the shamrock to illustrate the doctrine of the Trinity.

SHAMYL. See SCHAMYL.

SHANGHAI' or **SHANGHAE**, the most important seaport in China, is built on the left bank of the river Hwangpoo or Woosung, which is properly only the channel by which the waters of the Lake Tahoo or Tai (the Great Lake) are discharged into the mouth of the Yang-tse-kiang River, and thus into the sea. Though the course of the Woosung does not exceed 50 miles, it brings down a great volume of water, and is very deep. Opposite the town of Shanghai, which is about 10 miles from its mouth, the depth in the middle of the stream varies from 6 to 8 fathoms, so that the largest vessels can come up to the harbour and unload at the banks of the river, which at this place is nearly half a mile wide.

The town is very large (the wall being 5 miles in circuit), and there are extensive suburbs outside. The streets are narrow and many of them paved with small tiles. The houses are mostly of brick, but low and mean. On the side of the river east of the city, however, the foreign merchants, chiefly English, American, and French, have erected some very handsome houses, and the wide, airy streets here are well paved and lighted. In fact, there is very little to distinguish it from the fashionable suburb of some large English city, and it also has its own separate municipal government, which is conducted with an efficiency and attention to the interests of the settlers worthy of all praise. The conservation of the public peace and health are looked to with marked success, and an efficient system of drainage has been carried out. There are altogether fifteen foreign consuls, who have criminal jurisdiction over the subjects of their several nations. The Chinese town has a mint, and manufactures of silk and muslins, vegetable oils and oil-cake (vast quantities of which are sent into the interior), iron-ware, glass, paper, and ivory. But it is to its commerce that Shanghai owes its importance. It was first thrown open to European nations by the treaty of Nankin, in 1842, and the result has been the development of a most extensive foreign trade (chiefly British), and the erection of commodious docks, wharves, and other necessary appliances for a large commerce. There is regular steam communication with all the open ports in China and Japan, and with India and Europe. The anchorage extends for 5 miles down the river, which is crowded with shipping from all parts of the world. As many as 3000 junks, all employed in the coasting trade, are often in the port at one time. The foreign custom-house dues are, under a special arrangement, collected by foreigners. From this fund the approaches of the river have been made thoroughly secure by the establishment of lightships, buoys, and signals, and also by the employment of well-trained pilots. Indeed, the natural advantages of the port have been so much improved that it is now, undoubtedly, the maritime capital of China, and promises to become one of the most important commercial cities in the East. There are a chamber of commerce, reading-room, library, and literary institution. Several daily, weekly, and fortnightly newspapers in the English language, and also in Chinese, are published in the town. Shanghai is also the centre of various missions for converting the natives; and contains schools, dispensaries, and other benevolent institutions, mainly supported by the foreign merchants.

The exports are chiefly tea and silk, the province of Kiang-su, in which Shanghai is situated, producing very large quantities of the latter. Of the imports opium is extensively brought from India; cotton and woollen manufactures and hardware, from Great Britain; sugar from the Philippines; and sandal-wood, edible birds' nests, and other products from the Eastern Archipelago.

The magnitude of the foreign trade at Shanghai is accounted for by the circumstance that there is no harbour on the Chinese coast between 30° and 35° N. lat. The Woosung is the first river south of these limits which is deep enough for the purposes of navigation, and hence the

whole maritime commerce of this tract is concentrated at Shanghai. The country which lies at the back of the coast is the most populous part of China, and contains many very large towns. In addition to its extensive foreign and coasting commerce there is a vast inland trade, as the town is the entrepôt for most of the goods passing to and from the north and south provinces of the Chinese Empire. To facilitate this traffic the country which surrounds Shanghai—a level, well-cultivated plain, producing good crops of cotton, rice, and wheat—is intersected by the imperial and numerous smaller canals, some of which environ the walls and permeate the city itself in various directions. The population of Shanghai is estimated at about 300,000. Shanghai was taken on the 19th of June, 1842, by the British troops, who captured 171 pieces of cannon and a large amount of military stores.

SHANNON, in Irish Gaelic "the old river," the largest river in Ireland, has its source at the southern base of the Cullinagh Mountain, whence it flows in a deep dead sluggish stream into Lough Allen, in the county of Leitrim, a small basin about 8 miles long and from 3 to 4 broad. After leaving Lough Allen, it runs in a southerly direction for 6 miles, when it receives the waters from two small lakes called Boyle Water and Lough Key. It soon afterwards passes the towns of Leitrim and Carrick-on-Shannon, and flows through Lough Curry, Lough Boffin, and Lough Forbes. After passing Termonbarry and Lanesborough, and receiving the waters of the Camlin, the Shannon enters Lough Ree, which extends 16 miles in length by 1 to 3 in breadth. It reaches within 2 miles of Athlone, and between that place and Lough Derg makes two large bends, dividing itself into various branches, and forming some islands of considerable size. Near Shannon Bridge the river Suck joins it from the west, and at Shannon Harbour the Brusna falls into it on the east. At this point is the junction of the Grand Canal with the Shannon; and immediately opposite is another canal which extends to Ballinasloe. About 5 miles below Banagher the Lower Brusna falls into the Shannon from the east, and a wide and uninterrupted channel conducts the river into Lough Derg, an oblong lake 24 miles long by 1 to 3 broad. In this portion lie the Ballyshrule and Woodford rivers, streams of considerable size, and navigable for large boats. Below Killaloe the navigation of the river is interrupted by a series of falls. Immediately above Limerick the river divides into two branches, forming King's Island, on which the old town stands, with the cathedral, castle, and other public buildings.

All the portion hitherto described is called the Upper Shannon. It is much interrupted by shallows and falls, and numerous small canals have been cut for continuing the navigation. Such canals have been made near Lough Allen (5 miles), Jamestown (2 miles), Rooskey ($\frac{3}{4}$ mile), Termonbarry ($\frac{1}{2}$ mile), Lanesborough ($\frac{1}{2}$ mile), Athlone ($1\frac{1}{4}$ mile), Shannon Bridge ($\frac{1}{2}$ mile), Banagher ($\frac{1}{4}$ mile), Meelick (2 miles), Killaloe (2 miles), Castle Connell (7 miles), and Limerick (1 mile).

Under the name of the Lower Shannon is comprehended that part of the river below Limerick which is navigable for sea-going vessels. This estuary is easy of access and its approach free from dangers; the entrance between the Loop Head and Kerry Head is 7 miles wide, and on the former stands a lighthouse, showing a bright fixed light at the height of 270 feet above high water. Between Kilkadran Point, which also has a lighthouse, and Beal Point the width is contracted to about a mile. Five miles higher up is Scattery Island, on the Clare coast, about three-quarters of a mile long, rather low and marked by one of the Round Towers; it has a battery on its southern point. Five miles south-east of Scattery is Tarbert Peninsula (formerly an island), on which is a lighthouse showing a brilliant fixed light 58 feet above the sea.

Above this the river contracts to less than a mile in width. Eight miles above Tarbert is Foynes Island, between which and the mainland there is a good harbour, though the entrance is rather intricate. Above Foynes, near which the river Fergus enters, the Shannon becomes interrupted by islands, rocks, and shoals, which, though mostly covered at high water, greatly impede the navigation at other times. At Limerick a very fine range of quays has been constructed. Besides the Fergus, the principal rivers which flow into the Lower Shannon are the Maigue and the Askeaton. There is good anchorage in every part of the Lower Shannon, and shelter from the prevailing westerly winds at Scattery, Tarbert, Labishda, and Foynes.

The spring tides in the Shannon rise from 17 to 13 feet, the neaps about 14 feet; the velocity, which at the mouth does not exceed a mile an hour, increases as the river becomes narrower to upwards of 3 miles during the ebb at springs.

Before it mingles with the Atlantic, in its great estuary between Kerry and Clare, the Shannon traverses for more than 200 miles the provinces of Leinster, Munster, and Connaught, and penetrates with its feeding streams not less than twelve counties. Nature has thus marked out this great water-line as at once an internal channel of traffic and a receptacle for a large part of the superfluous moisture of a wet climate. An Act of Parliament was passed in 1875 to remedy the defects in its drainage, and as an avenue of communication for the west of Ireland the river has been skilfully treated, and is now an excellent water road, although the navigation is by no means so perfect as it might be made.

SHANNY (*Blennius pholis*) is a common British species of **BLANNY**. The shanny is abundant on rocky coasts, being frequently found under stones at low tide. It can creep on to the land by means of its ventral fins, and can live out of the water for some days. It feeds on crustaceans and molluscs, which it scrapes off the rocks with its strong teeth. In the sea these fishes swim slowly, and generally keep near the bottom. The shanny is sometimes called the smooth blenny, because it has a scaleless other species, crests on the head. It is about 5 inches long, of an olive green, irregularly mottled with black, but the colours vary considerably. It is not used for food.

SHARES in trading companies are usually of equal value in each class, shareholders who desire to have large holdings taking more shares. The profits are divided equally among the shares, and each shareholder receives as many portions of profit as he holds shares. These are *ordinary shares*. But as it often occurs that after a company has started its capital is found to be insufficient, the expedient adopted in such a case is usually to issue *preference shares*, rather than to issue more of the ordinary shares, as investors require in such circumstances to be tempted by additional inducements; or to put it another way, investors are disposed to make profit out of the necessities of the company. Such preference shares receive a certain agreed dividend as a first charge on the profits, and the remaining profit alone is divided among the ordinary shareholders. On the other hand, the share market is also familiar with *deferred shares*, shares which take no profit until the ordinary shareholders have been paid a certain minimum dividend, or until some other condition of a similar character is fulfilled. When a profit minimum is converted into a company the shares that the vendors retain are often deferred; and as the old partners remain for a time as managers of the new company the energy will be no less carefully applied to the business than before.

SHARK (Selachoides) is a large group of fishes forming with the **RAYS** (Batoides) the order **CHONDROPTERYGII** (or **Plagiostomi**). The sharks have an elongated cylindrical

cal body, tapering gradually to the powerful flexible tail, which is unequally lobed (or *heterocercal*). The snout is more or less pointed, and overhangs the mouth. The gill-clefts are lateral. The skin is covered with calcified papillæ or spines similar in structure to teeth, forming what is known as shagreen. The teeth are disposed in rows, and generally large, sharp, and formed for cutting, with the edges often serrated. Some species have only small teeth, and feed on molluscs and small animals; but the majority are remarkably predaceous, and are most formidable to every animal that comes within their reach. Sharks inhabit all seas, but are most abundant in the tropics. Many of the larger species frequent the open ocean, while the smaller kinds are mostly inhabitants of the shores. None descend to any great depth. Some species enter large rivers, as *Carcharias gangeticus*, which is found in the Ganges and Tigris to a considerable distance from the mouth. About 250 species are known. Some of the species are oviparous; the eggs are large, few in number, and each enclosed in a tough leathery envelope generally square in shape, with each corner produced into a tooth for the attachment of the eggs to seaweeds, &c.; the empty egg cases are frequently thrown up on the shore, and are popularly known as Mermid's Bales. In other species the eggs are hatched in the lower part of the ovulium, and the embryos undergo there their early development; in *Carcharias* and *Mustela lina* a placenta is developed for the attachment of the embryo. Cephalopods take place in all the species, and the fishes are provided with spines. The embryos are provided with external gill appendages.

The family Carcharidae contains some of the most typical sharks; there are two dorsal fins, the first opposite to the space between the pectoral and ventral fins; an anal fin, and a nictitating membrane are present. Between thirty and forty species of the typical genus *Carcharias* are known from tropical and temperate seas. The Blue Shark (*Carcharias glaucus*) is a tolerably common species on the southern coasts of England and Ireland. It is a small species, rarely more than 8 feet long, and usually 6 feet or less. The fins and the upper parts of the body are of a fine slaty-blue colour, the belly being white. The mouth is armed with large flat triangular teeth, serrated along the edges. The blue shark is frequently caught in summer off the Cornish coast where it preys on the pilchards and herring, and often does much mischief to the fishermen's nets and lines. It is found in the Mediterranean and most temperate and tropical seas. The White Shark (*Carcharias albus*), abundant in the warmer parts of the world, is one of the most formidable tyrants of the sea, being equally powerful and voracious. It attains a length of from 30 to 55 feet, and is a grey-brown above and white beneath. It will follow a ship for weeks to feed on any animal sub-

merged beneath the surface. The large mouth is armed with rows of formidable triangular serrated teeth. It is capable of biting a man in half with one snap of its powerful jaws. A species of a really allied genus, *Isodonotus arcticus*, a remarkable form being found in Arctic seas. The Torpedo (Electric) HAMMERHEAD (*Zygana*), and HOUND (Mustelus) belong also to this family.

The family Lamnidae has no nictitating membrane, and the species are about 100 or more.

The Basking Shark (*Selache maximus*) is the largest species found in the North Atlantic, attaining a length of from 30 to 55 feet, and weighing 8 or 10 tons. It has a short blunt snout and a very wide mouth, which is furnished with numerous very small, conical teeth, the second dorsal fin and the anal are very small and from the anal fin to the base of the tail there is a prominent keel on each side of the body; the gill-clefts are very deep. The basking shark derives its name from its habit of lying motionless

on the surface of the sea, several together, with the upper part of the body raised out of the water. It is a harmless species, and feeds on crustaceans and small fishes. The basking shark is abundant in early summer off the west coast of Ireland, where it is harpooned for the sake of the oil yielded by the liver in large quantities; it also occurs on the northern and western coasts of Britain, and is occasionally cast ashore on the southern coasts of England. In November, 1883, it was captured on the Australian coast, where its occurrence was not previously known.

Carcharodon rondeletii is an allied species, occurring in all tropical and subtropical seas, but nowhere common. It appears to be verging on extinction, and nothing is known of its habits. It grows to a length of 10 feet, and is remarkable for the size of its teeth, which are large, regularly triangular, with serrated edges; fossil teeth of extinct species of *Carcharodon* are very common in Tertiary deposits, and were found in abundance in the core of the bed of the Pacific by the *Challenger* expedition. *Lamna* (POMMEAGLE) and *Alopias* (FOX-SHARK or THIESHER) also belong to the family Lamnidae.

The family Rhinodontidae contains a single species from the Indo-Pacific, *Rhinodon indicus*. It resembles the basking shark very nearly, and is the largest shark known, being over 50 feet long, sometimes, it is said, even attaining a length of 70 feet. Not many specimens have been caught, most of them at the Cape of Good Hope.

The family Notidanidae contains only one genus, *Notidanus*, with only one dorsal fin, no nictitating membrane, and six or seven gill openings. The Gray Shark (*Notidanus griseus*) occurs in the Atlantic and Mediterranean, and is occasionally captured on the southern coasts of England. It is about 11 or 12 feet long, of a blackish-brown colour on the back, gray on the sides, and white on the belly. It has six gill-openings, placed very close together.

The family Squaliidae contains a large number of species, the majority of which are of small size and frequent the coast, living at the bottom of the sea and feeding on crustaceans and small fishes; there are two dorsal fins, no nictitating membrane, and the teeth are small. The majority of the species are known as DOG-FISHES, belonging to the genus *Squalium*, and closely allied genera. The Tiger Shark (*Stegostoma tigrinum*) is very common in the Indian Ocean. It is a handsome species, from 10 to 15 feet long, of a brownish-yellow colour, adorned with darker bands or spots. Another genus of this family, *Crossorhinus*, contains three species from Australian and Japanese seas remarkable for the development of skinny appendages on the sides of the head, which, together with their colour, renders them almost indistinguishable among the seaweeds at the sea-bottom where they live. A similar development of frond-like tentacles occurs in some Australian sea-horses (*Phyllopteryx*); but in these sharks the object is rather concealment from their prey than protection from their enemies. These sharks are about 10 feet long.

The Port Jackson Shark (*Cestracion philippi*) belongs to the only genus of the family Cestracionidae, which has small blunt teeth, formed for crushing the shells of molluscs and crustaceans; each dorsal fin is armed with a spine in front. The Port Jackson shark ranges from Japan to New Zealand, and is about 5 feet long.

The family Spinaciidae has two dorsal fins, often with spines, and no anal fin. The best known species are known as Spiny Dog fishes, and belong to the genus *ACANTHIAS*; one species, the Picked Dog-fish (*Acanthias vulgaris*) is the commonest of British sharks.

The Greenland Shark (*Lamargus borealis*) inhabits the Arctic seas, and occasionally strays to the northern coasts of Britain. It is about 15 feet long, brown in colour, deeply shaded with blue. It is one of the greatest enemies of the Greenland whale, frequently biting large pieces out of

the flesh of the living animal; even when men are engaged in cutting off the blubber of a dead whale it is said that this voracious shark cannot be kept away from the feast though attacked with spears and knives. It feeds also on fishes and small crustaceans.

The Spinous Shark (*Echinorhinus spinosus*), a member of the same family, is found occasionally on the south coast of England and the Mediterranean, and ranges to the Cape of Good Hope. It has a short thick body, covered on the back and sides with large spines; the tail is short and the fins are small. It feeds chiefly on crustaceans, and is 6 or 8 feet long.

The family Rhinidae contains only the ANGEL-FISH (*Rhina aquatina*) or Monk-fish, distinguished by the flattened body and expanded pectoral and ventral fins, giving it a resemblance to the rays. The last family of sharks, Pristiophoridae, contains only a single genus, *Pristiophorus*, from Australian and Japanese seas, closely resembling the saw-fishes.

The rough skin or "shagreen" of sharks is used for smoothing or polishing fine-grained wood. In the East the flesh of the smaller kinds, though coarse, is eaten. In India and China sharks' fins form an important article of commerce, as they contain an abundance of gelatin. In many species the liver yields a considerable quantity of oil, which is used for medicinal purposes. There is a considerable shark fishery on the coasts of Ceylon.

SHARP, the sign in music (♯) which expresses, in ordinary musical parlance, that the note to which it is prefixed is to be raised a semitone above its natural position. The origin of the sign is given in the article ACCIDENTALS. The double sharp (×) raises the note two semitones.

As the sharp is exactly the converse of the flat, the remarks as to the value and musical ratio of the interval given in the article FLAT need not be here repeated.

The Italian term for sharp is *diezis* ($F\sharp = F \text{ diezis}$), and the French *dièse* ($F\sharp = F \text{ dièse}$), both highly objectionable, as the *Diezis* is shown, in the article under that heading, to be a quite distinct interval in the ancient Greek musical system of very small ratio, by no means comparable in size to a sharp, but much more like an altered unison. Our own name, which is equal to "acute," well expresses the nature of the alteration made by the sign. The German name describes the appearance of the sign, and is *Kreuz* (cross). $F\sharp$ in German is *Fis*. $F\sharp$ in French is *F double dièse*, and in German *Fisis*. Similar nomenclature applies to other sharpened notes.

The keys $F\sharp$, $G\sharp$, &c., are called in Italian *Fa diezis*, *Sol diezis*, &c.; in French *Fa dièse*, *Sol dièse*, &c.; and in German *Fis*, *Gis*, &c. A curious custom existed in Germany, almost to our own day, of using "sharp" for "major." Thus Beethoven inscribed the *Leonora* overture No. 1 with his own hand as "Ouverture in $C\sharp$ " (It is in C major.)

SHARP, GRANVILLE, an English philanthropist, was born in Durham in 1734. He was the son of Dr. Thomas Sharp, archdeacon of Northumberland, author of several philological, antiquarian, and religious works, and grandson of Dr. John Sharp, archbishop of York. He quitted the study of law for a place in the Ordnance Office, which he resigned at the commencement of the American War, from disapprobation of the course pursued by the government. In 1769 he befriended a negro slave named Somerset, who had been brought to England, and on falling ill had been turned into the streets by his master. When, two years later, the negro's master claimed him, and had him arrested and imprisoned, Sharp summoned them both before the lord mayor, who discharged the slave; but the master refusing to give him up, Sharp brought the case before the Court of King's Bench, the twelve judges of which, in May, 1772, decided that a slave could not be held in or

transported from England. From this time Mr. Sharp devoted his powers to the overthrow of slavery and the slave trade. He wrote numerous pamphlets on the subject, and was chairman of the meeting held in London, 22nd May, 1787, which formed the "Association for the Abolition of Negro Slavery." He was one of the founders of the British colony of Sierra Leone, drew up a plan for its temporary government, and sent many negroes there at his own expense. He also opposed the importation of seamen, and advocated parliamentary reform and the extension of privileges to Ireland. He died in London on July, 1813.

SHARP, JAMES, a Scottish prelate, was born in the Castle of Banff in May, 1618. He was educated for the church at the University of Aberdeen, and students who in 1638 declared themselves against "Solemn League and Covenant." In 1640 he was professor of philosophy in St. Leonard's College, St. Andrews, and shortly after became minister of the parish of Crail. In 1656 he was chosen to plead for the Presbyterians before the Protector; and in 1660, when Monk marched upon London, he was regularly accredited to that general as their representative, and was sent over to Charles II. at Breda to procure the establishment of presbytery. He was received very favourably by the king, and obtained the royal word "to protect and preserve the government of the Church of Scotland, as it is settled by law, without violation." The next Scottish parliament, however, repealed all Acts passed since 1633, the church "settled by law" thus becoming the old Episcopal Church; and it was asserted that Sharp was an accomplice in this scheme. While in London he had been elected professor of divinity in St. Mary's College, St. Andrews, and also appointed the king's chaplain for Scotland, with a salary of £200. In December, 1661, he was consecrated Archbishop of St. Andrews, an appointment which rendered him excessively odious. The wanton cruelty with which the Covenanters were persecuted was attributed to him, and it is certain that, after the rout at Pentlands Hills, when he had received the king's order to stop the executions, he kept it for some time private. A creature of Sharps named Carnichael had machined for partiality against the Presbyterians, and nine men formed a plan to waylay and murder him. While they were waiting for him, the archbishop passed by with his daughter and a few attendants; shouting, "The Lord has delivered him into our hands," they dragged him from his coach and despatched him on Magnus Mann, near St. Andrews, 3rd May 1679. The story is finely told in Scott's "Old Mortality."

SHASTRA or **SASTRA**, among the Hindus, a sacred book; a book containing sacred ordinances. The six great *Shastras*, which, in the opinion of the Hindus, contain all knowledge, human and divine, are the Veda, Upaveda, Vedanga, Purana, Dharma, and Darsana.

SHAWL, a garment worn upon the shoulders or about the waist, and formed of wool, silk, hair, or cotton. The word is of Persian origin (*shawl*). The following are the principal varieties of shawls: those of Cashmere, woven in India or imitated in Europe, with the designs either embroidered upon the fabric, or by the more costly method worked into the web in the process of weaving, thus making both sides alike; crape shawls, made of silk in imitation of the Chinese fabrics; grenadines, made of silk of a peculiar twist; chenilles, of silk, often combined with cotton; chiné, made with a warp printed before weaving; barge, of wool, in imitation of shawls made by the peasantry at Barèges in the Pyrenees; woollen shawls of various kinds; and tatan plaids, made for centuries in Scotland. A description of the colours of tatans worn by the different clans in 1570 is extant. Their use was prohibited by Act of Parliament from 1717 to 1782; and they became fashionable from about 1828, and have so continued to some

extent. The manufacture of Cashmere shawls was introduced from India in 1784 at Norwich, England, with the imported Tibet wool, and afterwards with Piedmont silk warp and fine worsted shoot, the designs being worked in by hand. In 1805 the shawls were there first completed entirely upon the loom. About the same time the manufacture was introduced into Paisley and Edinburgh, and is still continued at the former place. In Paris the manufacture was begun in 1802, and led Jacquard to the invention of his loom. Owing to the fluctuations of fashion there has been but little demand for the finer products of European looms for many years.

SHAWM. See SHALM.

SHEARWATER (*Puffinus*) is a genus of birds belonging to the family Puffinids (Procellariidae), distinguished by having the bill rather longer than the head, slender, compressed, and strongly curved at the tip, the nostrils opening separately, the legs moderately long, the toes long and webbed, the wings long and pointed, and the tail short and rounded. The shearwaters are found in all seas, generally near the land, though they seldom visit the shore, except for the purpose of incubation. They are very powerful on the wing, and appear seldom to take rest, but occasionally they are seen resting on the surface of the waves. They are good swimmers and divers. About twenty species are known.

The Manx Shearwater (*Puffinus anglicorum*) is the only species that breeds in this country. It owes its name to its former abundance on the Gut of Man, a small island on the south-western extremity of the Isle of Man, which is now entirely deserted by this bird. It still breeds in abundance in the Orkneys and along the coast of Norway, and is frequently seen along the western coasts of Britain, but is common in the autumn on the Cornish coasts. In the winter it ranges to the Mediterranean, the Canaries, Madeira, &c. The Manx Shearwater is about 11 inches long, brownish-black above, white below, with the sides of



Shearwater (*Puffinus anglicorum*).

the neck barred with gray; the bill is brownish, and the legs and feet dull orange. It breeds about April, on small islets or crevices in the rocks or in deserted rabbit burrows, and lays a single white egg on a few blades of dry grass. The young birds are densely covered with down and are very fat.

The Great Shearwater (*Puffinus major*), a rather larger species, is common on the coasts of North America, and occurs in autumn on the western coasts of Britain, especially off Cornwall. Two other species occasionally visit Britain, the Sooty Shearwater (*Puffinus griseus*) and the Dusky Shearwater (*Puffinus obscurus*), but the latter is very rarely seen on our coasts.

The name Shearwater is also given to the Scissor-Bill, or Skinner (Rhyacops), a bird of the gull family (Laridae).

SHEAT-FISH (*Silurus glanis*) is a species of fish belonging to the family CATFISHES (Siluridae). It is found in the rivers of Europe east of the Rhine, and is the largest of European fresh-water fishes, attaining a weight of 500 or 600 lbs., and a length of from 8 to even 16 feet. In its habits it resembles the eel; it burrows in the mud,

or conceals itself under the trunks and roots of trees which have become submerged in the great eddies formed by the bends and angles of the river. Though sluggish and unwieldy, it can exert considerable agility at will, and the sudden springs which it will make when a frog or any other dainty comes within reach, are remarkable in a creature of its bulk. Its voracity is amazing; it will prey on all kinds of fish, worms, frogs, and even small mammals. Its appearance is not prepossessing. Its broad flattened head, its vast cavernous mouth, its small frog-like eyes, and six long tapering barbels, which bevel inwards over the head like small fishing rods, are by no means elements of beauty. The head and body are covered with soft skin. Its colour is a mottled brownish-olive. The dorsal fin is very small and spineless, while the anal is very long, reaching to the rounded caudal fin. The flesh of the smaller specimens is firm and well-flavoured. Attempts have been made to introduce it into the Thames.

SHEA-TREE. See BASSIA.

SHEATH-BILL (*Chionis*) is a genus of birds belonging to the order GRALLAE and family Chionidae. They are distinguished by having the bill stout and short, compressed and highly arched towards the tip, with the nostrils at the base protected by a horny sheath; the wings are long and pointed; the tail is of moderate length; the tarsi are stout and short; the anterior toes are long, united at the base; and the posterior toe is small and elevated. The White Sheath-bill (*Chionis alba*) is found upon the shores of the islands of the western portion of the Southern Ocean, but it does not visit the coasts of New Zealand and Australia, as is sometimes stated. It is about 15 inches long, with much of the appearance of a pigeon. Its plumage is pure white, with the skin round the eyes naked and beset with papillae of a yellowish colour; the bill is yellow at the base, passing into pale pink at the tip; the legs are bluish gray. It is a solitary and shy bird, frequenting rocks at low water and feeding on molluscs and seaweeds. The flesh of the white sheath-bill has a flavour like that of some of the wild ducks. At certain seasons it possesses a very harsh taste and disagreeable odour. A second species is known, the Lesser Sheath-bill (*Chionis minor*), found further east in the Antarctic Ocean. It resembles the preceding species in appearance and habits, but is smaller, and has the bill and the bare skin of the face black.

SHEEP (*Ovis*) is a genus of RUMINANTS, so closely connected with the GOATS (*Capra*) that it is very doubtful if they should be generically distinguished. Sheep differ from the goats in having the horns, which in the wild species are present in both sexes, though smaller in the female, triangular, transversely ridged and spirally curved; by the convex outline of the forehead; by the absence of the beard; and by the presence of a deep sac between the two middle toes, which secretes an unctuous and odorous substance. The tail is short in all the wild species, and the fleece is generally hairy, with a scanty wool at the roots.

The wild species of sheep are inhabitants of mountainous regions or of high, elevated table-lands; with one exception they are confined to the Old World, and the majority originated in Asia. The wild animals are gregarious, and are remarkably active and sure-footed.

Marco Polo's Sheep (*Ovis poli*) is a splendid species, inhabiting the highlands of Central Asia in the neighbourhood of the Thian Shan Mountains, at an elevation of from 9000 to 16,000 feet above the sea-level. It stands nearly 4 feet high at the shoulder, and has very large spirally curved horns, pointed directly outwards, and measuring in the adult male over 5 feet in length from base to tip. The ARGALI or Ammon (*Ovis ammon*), fig. 1 of Plate, is found further east and north, and is also a large species, with horns 4 feet in length measured along their

curve. The *BURRIEL*, or *Nahoor* (*Ovis burriel*) is a smaller species from the Himalayas. There are several other Asiatic species from the same regions, and one (*Ovis nivicola*) extends as far north as Kamtschatka. The African Argali or *Tragelaphus* (*Ovis tragelaphus*) inhabits the mountains of North Africa from Abyssinia to Barbary. It is sometimes called the bearded sheep, for, though the hair on the chin is short, it attains a great length on the foreneck and the front of the forelegs. The body is reddish-yellow, and the tail is comparatively long and tufted at the extremity. It is a large species, but the horns are not massive, and hardly exceed 2 feet in length. The Mouflon (*Ovis musimon*) is a small species now confined to Corsica and Sardinia, though formerly it was abundant in Spain. Another species, *Ovis ophion*, is entirely confined to the island of Cyprus, where at the time of the British occupation (in 1878) it was almost extinct, but has now increased in numbers. The American Argali or Big-horn (*Ovis montana*, fig. 2), found chiefly in the neighbourhood of the Rocky Mountains, is the only native sheep of the American continent. It stands about $3\frac{1}{2}$ feet high at the shoulder; the horns in the male measure nearly 3 feet, and are curved so far forward and downward as to prevent the animal from feeding on level ground. The flesh is of a very fine flavour. Fig 3 is the Ibex Goat (*Capra ibex*). See IBEX.

The origin of the domestic sheep is a matter of uncertainty; it is not known whether our domestic breeds are derived from one of the existing wild species or from crosses between several, or from one or more species now extinct. It is certain that the sheep has been domesticated from a very early period, indeed from prehistoric times, for the bones of a small breed are found in the Swiss lake-dwellings. The domestic breeds vary chiefly in the relative development of the wool; in the presence or absence, shape, and number of the horns, of which there are sometimes four or even eight; in the form and length of the ears, which are often pendulous; and in the length of the tail, in which a great quantity of fat is sometimes deposited.

The records of olden times are very unsatisfactory with regard to the existence of the sheep in Britain. No early historian makes the slightest mention of them. Even Caesar, who describes so much at length the employments and habits of the British, never alludes in the most distant manner to the sheep, or the employment of its wool. The subjugation, however, of Britain having been completed, the conquerors turned their attention to the improvement of the country; and among other things they established a woollen manufactory at Winchester. So well did this succeed that the woollen cloths of Britain soon began to vie with the productions of every other part of the Roman Empire. The sheep employed in furnishing the material of these productions were the *Short-woolled Breed*. Winchester was situated in the centre of a country which then, as now, could support short-woolled sheep alone.

It would appear to have been some centuries after this that the *Long-woolled Sheep* was introduced. The manufactures of the Winchester mills continued, however, to be duly estimated, and, in point of fact, the cultivation of the various breeds of sheep and the manufacture of the fleece into many different kinds of cloth, had begun to constitute the chief employment and wealth of the country.

The covering of the original sheep consisted of a mixture of hair and wool, which is distinguished by possessing the property of felting; the wool being short and fine, and forming an inner coat, and the hair of greater length, projecting through the wool, and constituting an external covering. When the sheep are neglected or exposed to a considerable degree of cold, this degeneracy is easily traced. On the Devonshire moors, the mountains of Wales, and the highlands of Scotland the wool is deteriorated by a considerable admixture of hair. Even among the South Downs

and the Leicesters, too many kemps or hairs occasionally lessen the value of the fleece. It is only by diligent cultivation that the quantity of hair has been generally diminished, and that of wool increased in our best breeds.

The filaments of wool taken from a healthy sheep present a beautifully polished and even glittering appearance. Those of the neglected or half-starved animal exhibit a paler hue. This is one valuable indication by which the wool-stapler is enabled to form an accurate opinion of the value of the fleece. The mixture of hair in the wool can often be detected by close examination with the naked eye, but more readily by the assistance of a microscope.

Among the qualities which influence the value of the wool are fineness, and the uniformity of that fineness in the single fibre and in the collected fleece. This fineness, however, differs materially in different parts of the fleece. It is greatest on the shoulders, the ribs, and the back. It is less on the legs, thighs, and haunch, and still coarser on the neck, the breast, the belly, and the lower part of the legs. The fineness of the wool is considerably influenced by the temperature. Sheep in a hot climate yield a comparatively coarse wool. Sheep imported from Europe to the West Indies and the west coast of Africa lose all their wool except that over the loins after the third generation. The fineness of the fleece is also much influenced by the kind of food. An abundance of nutriment will increase both the length and the bulk of the wool. This is an important consideration with the sheep-breeder.

Short-woolled Sheep.—The South Downs or their congenies supported the first manufactory at Winchester. The South Downs were formerly of a very small size, and far from possessing a good shape, but the size and shape have been of late years greatly improved, and the fleece is short, close, curled, and free from lambs, and weighs between 3 and 4 lbs. The South Downs are adapted to almost any situation in the midland part of England. They have a patience of occasional short keep and an endurance of hard stocking equal to any other sheep; an early maturity, scarcely inferior to the Leicesters, and the flesh finely grained and of good flavour. The colour is generally white, and the face and legs are black, dark-coloured, or speckled, both sexes are hornless. The South Downs have succeeded admirably in all the southern districts of the kingdom, but the northern hills have occasionally been too cold for them. Crosses between the South Downs and almost every breed of medium wool sheep have answered well; while in counties where it could have been least expected the old breed is in a great measure superseded by the South Downs.

In Dorsetshire there is a very different and valuable breed of sheep. They are white, and both sexes have small horns; the face is long and broad, with a tuft of wool on the forehead; the shoulders low, but broad; the chest deep, the loins broad, and the bone small. Their chief peculiarity is the forwardness of the ewes, which supply the market with lamb when it produces the highest price. If they have plenty of nutritious food, the ewes will be in lamb as early as June, so that the young one will drop in October, and be ready for the market at Christmas. Various breeds of short-wool sheep still prevail in Hampshire, Shropshire, &c.

The Cheviots extend from Westmorland far into Scotland. Their birthplace, or where they were originally observed, and are still found in their greatest purity, is the Cheviot Hills, in Northumberland. They differ essentially from both the black and the dun-faced breeds by which they are surrounded, but neither history nor tradition has given the slightest clue to their origin. The Cheviots are well adapted for elevated pastures, consisting of coarser grasses mixed with heath. They have a long body with a close white fleece, weighing about 3 lbs.; the face and legs are white, and both sexes are hornless.

The wool is inferior to that of the South Downs, and the use of it is abandoned in the manufacture of fine cloth. There are many flocks of pure Cheviots, but in the majority of the flocks there is a cross of Leicester blood.

The other breed of short-woolled sheep which contend with the Cheviots in number and value, is the Blackfaced or Heath breed. They extend from Lancashire to the very north of Scotland. The faces and legs are always black. The fleece is long and somewhat coarse, being sometimes a good deal mixed with hair. Horns are present in both sexes, those of the male being large and greatly twisted. The flesh is fine-grained and well-flavoured. The blackfaced breed, though inferior in size and value to the Cheviot, surpasses it in hardiness. The Welsh sheep is a similar breed, famous for the excellence of its mutton; it is very small. Another allied small hardy mountain breed is that of the Shetland and Orkney Islands, valued for its wool, which is knitted for stockings. It is often hornless.

Long-woolled Sheep.—The New Leicester will, to a very considerable degree, serve as a type of all the varieties of the long-woolled sheep. The head should be hornless, long, small, tapering towards the muzzle, and projecting horizontally forwards. The eyes prominent, but with a quiet expression. The ears thin, rather long, and directed backwards; the neck full and broad at its base, but gradually tapering towards the head, and particularly fine at the junction of the head and neck. The neck seeming to project straight from the chest, so that there is, with the slightest possible deviation, one continued horizontal line from the rump to the point. The breast broad and full; the shoulders also broad and round. The arm fleshy through its whole extent, and even down to the knee. The bones of the leg small, standing wide apart, no looseness of the skin about them, and comparatively bare of wool. The chest and barrel are at once deep and round; the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The quarters long and full, and as wide as the fore-legs. The legs of a moderate length; the pelt also moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer. Such is the Leicester sheep as Mr. Bakewell made him. He found him as different an animal as it was possible to conceive—flat-sided, huge-boned, coarse-woolled, slow to fatten, and his flesh of little value.

The improved breed have spread themselves to every part of the United Kingdom. There are few other varieties of long-woolled sheep which do not owe much of their excellence to the New Leicesters, and even some of the short-woolled flocks are deeply indebted to the breed introduced by Mr. Bakewell. There is no other species of sheep that possesses so decided a propensity to fatten, or that is prepared for the butcher at so early an age. It was not to be seen, then, on a poor soil, nor if it is compared to the wild, in order to procure its food; but on soils of moderate quality there is no other sheep so profitable. A great deal of its excellence is its extreme docility. The wool has considerably increased in length, and it has improved both in fineness and strength of fibre. It averages from 6 to 7 lb. the fleece, and the fibre varies from 5 to more than 12 turns in length. Like all other British wools, it is applied to a purpose different from that to which it was formerly devoted, and is used entirely for worsted yarns and goods.

The chief value of the New Leicester breed consists in the improvement which it has effected in almost every variety of sheep with which it has been crossed.

Other breeds of long-woolled sheep, such as the Teeswater, Lincoln, Cotswold, and Romney Marsh, have been crossed to such an extent with the Leicester as to constitute now merely sub-varieties.

The foreign breeds of sheep are very various, and need but a passing notice. The most famous is the MERINO, which is dealt with separately; this is the chief breed cultivated in Australia, but it does not succeed well in this country. In the East are some peculiar breeds, with an enormous development of fat on the rump or tail. In one variety, found both in Southern Asia and Africa, there are two large masses of fat on each side of the lower part of the tail. The fat-rumped sheep of Tartary has a similar deposition of fat (often weighing 70 or 80 lbs.) on the rump, extending downwards so as to conceal the short tail. The Fezzan breed of North Africa is a fine breed, with long legs, much arched face, pendulous ears, and a short, curled, and crispy fleece. The Persian breed is very similar. The Astrakhan or Bokharan breed has a fine spirally twisted wool; the lambskins—of a mixed black and white—are highly prized by furriers. The lambskins of the Caucasian breed are also very valuable for lining robes, &c.; the wool, by gentle pressure by linen coverings as the lamb grows, and by pouring warm water over it daily, is made to lie in beautiful glossy ringlets. The wool of the adult is coarse on the body, but is fine and long on the tail, which is of great length, dragging on the ground.

Sheep will thrive on a variety of pastures, and succeed well on short and scanty herbage; they especially relish aromatic and bitter herbs. During the winter turnips form the staple food, mixed with hay, &c. After lambing both the ewe and her offspring need an abundance of green food. The usual time for shearing is from the latter end of May to the middle of June, but fat sheep for the market are often sheared as early as April; and the mountain sheep are not sheared till July.

The usual proportion in a flock is one ram to forty ewes. The ewe is fit for procreation at one year, and the ram at one year and a half. The coupling of the sexes takes place usually about the beginning of October. Gestation lasts about twenty-one weeks; one or two are produced at a birth, sometimes three, but rarely more. The lambs are not weaned, as a rule, till nearly three months old.

Sheep are subject to certain diseases. Of these, one of the most fatal is the *rot*, caused by the presence in the liver of a number of the LIVER-FLUKE (*Fasciola hepatica*), a trematode worm which is very prevalent in damp pastures, passing its larval existence in a snail, the *Limæna truncatulus*. A BOVILY (*Oestrus ovis*) has its abode in the larval condition in the frontal sinuses of the sheep, creating on its passage intolerable irritation; this sometimes causes great destruction from the madness of the terrified and tormented flock. The foot-rot arises from the suppression of the secretion from the interdigital pit. Sheep are also subject to the attacks of ticks.

According to the agricultural statistics published in 1886, the following were the number of sheep in the United Kingdom in that year:—

England,	16,102,138
Wales,	2,514,069
Scotland,	6,603,611
Ireland,	3,367,722

Total, 28,888,410

The number of sheep and lambs imported in 1886, chiefly from Holland, Hamburg, and Denmark, was 1,038,967.

SHEEP-DOG is a valuable variety of Dog employed by shepherds to assist them in tending their flocks.

It is an ancient breed, and there is much of the appearance of a wolf in its slender form, pointed muzzle, short and more or less erect ears, and bushy curved tail. The hair is long and shaggy, usually black, varied with gray or brown. The sheep-dog is quiet, active, courageous, and unequalled for intelligence and docility. There are three

varieties found in Great Britain. Of these the Scotch sheep-dog or collie is the best known. It stands from 12 to 14 inches high. From its graceful appearance and high intelligence it is greatly valued as a pet. The southern sheep-dog is rather larger, but has shorter hair. The drover's dog, which is largely used in driving cattle and sheep to market, is often a cross-breed.

SHEEP'SHANKS' DONATIONS. In 1857 Mr. John Sheepshanks, by a deed of gift, presented to the nation his splendid collection of paintings, valued at £60,000, and now exhibited at the Kensington Museum. In 1858 the trustees of his brother, the Rev. Richard Sheepshanks, presented £10,000 stock to Trinity College, Cambridge, for the promotion of the study of astronomy, &c.

SHEEP'S-HEAD (*Sargus oris*) is a species of fish belonging to the family Sparidae, abundant on the Atlantic coasts of the United States of America, where it is one of the most valuable food fishes. The sheep's-head is about 30 inches long, and attains a weight of 15 lbs. It has a short, thick body, rounded on the back; the colour is light gray, with 7 or 8 dark transverse bands. The dorsal fin has twelve spines and twelve rays, and there is a recumbent spine in front of it; the jaws have a single series of cutting teeth in front and several series of rounded ones at the sides. It feeds on shell-fish and crustaceans. It is caught readily in nets and seines. This fish is greatly esteemed for the table, and fetches a high price. Several other species of the same genus occur in the Mediterranean, and were well known to and valued for food by the ancients.

SHEEP-TICK (*Melophagus ovinus*) is a small insect belonging to the family Hippoboscidae and order Diptera. It is parasitic on sheep, lambs being especially infested with it. It is totally devoid of wings, and has a smooth compressed body, of a dark brown colour; the head and thorax are small, and the abdomen is large. The eggs are hatched and undergo their early development within the parent's body, the young insects being deposited on the wool of the sheep in the form of a large soft, white, oval-shaped pupa. The perfect insect fixes its head in the skin of the victim and sucks the blood, forming a large round tumour. The sheep-tick is most abundant in the early summer. Various washes, containing arsenic or carbolic acid, are used for its destruction. McDougall's dip, a preparation of carbolic acid, is at once safe and effectual.

SHEERNESS, a seaport town and naval arsenal of England, in the county of Kent, situated on the north-western part of the Isle of Sheppey, on the eastern side of the Medway, at its junction with the Thames, 51 miles east from London by the London, Chatham, and Dover Railway. The town consists of four parts: Blue-town, which is inclosed by an outer line of fortifications; Mile-town, which is an outer uninclosed suburb; Marine-town, and Banks-town. The fortress occupies the extreme point of the island, and the principal batteries front the Thames. The dockyard is surrounded by a brick wall, and is now only of secondary importance, owing to the fact of its basins being too small to accommodate the large iron ships of the present time. It occupies nearly 60 acres, contains a wet dock of 3½ acres, in which ships are fitted, several dry docks, large storehouses, a mast-house, rigging-house, sail-loft, &c., with residences for the port-admiral, commissioner, and other officers. Outside of the yard is Garrison Point, with telegraph and coastguard stations, and large barracks. Opposite the river and sea is a long wharf, and a breakwater has been constructed for the protection of the harbour. The town has a pier, bathing establishment, various churches and chapels, Jews' synagogue, and handsome public rooms. Mile-town contains one building of great interest to the Wesleyans. The chapel in Hope Street was built and used by John Wesley. It is a wooden

edifice, and was removed from Blue-town to its present site. Corn, seeds, and oysters are exported to London; but the trade lies chiefly in the supply of the government establishments. There is constant communication with London and Chatham. Sheerness was attacked by the Dutch under Van Ruyter in 1667. The mutiny of the *Nore* broke out in this port in 1798. The population in 1881 was 13,941.

SHEFFIELD, a municipal and parliamentary borough in the South-west Riding of Yorkshire, is 162 miles N.E.W. from London by rail, and 52 miles S.S.W. of York. The town lies at the eastern base of that extensive range of hills which extends along the centre of England from Derbyshire to Westmorland, and it is now spread over various uneven but gradually subsiding tongues of land lying between the Porter, the Riveling, the Loxley, the Sheaf, and the Don, which here unite and form one considerable river—the Don. With the exception of the level outlet through which the Don flows, Sheffield is encompassed by an amphitheatric of hills.

It was the capital of the old district of Hallamshire, and in the beginning of the seventeenth century was only a large village. It now displays all the features of a manufacturing town of the first importance.

Generally it is well built, well paved, and abundantly supplied with water. The older streets are steep, narrow, and irregular; but the modern ones are wide and straight, lined with good houses, and many of the shops are but little inferior to those of the metropolis. The smoke, however, proceeding from the numerous steam engines, furnaces, and factories gives the town a dingy appearance, in strange contrast with the beauty of the surrounding country, embellished as it is in every direction by the residences of opulent bankers, merchants, and manufacturers. It possesses many fine public buildings, the principal of which are—the parish church, a cruciform pile of Henry I.'s reign, 240 feet long by 130 feet broad, with a central tower surmounted by a lofty spire; St. Paul's, a heavy Greek structure, with a tower surmounted by a dome and a cupola of cast iron; St. George's, St. Philip's, and St. Mary's, built chiefly at the expense of the ecclesiastical commissioners. Several well-designed and commodious churches have been erected in recent years, and there are now more than thirty places of worship belonging to the Establishment and fifty for different denominations of dissenters. The latter include St. Mary's Catholic church, which has a tower 200 feet high, and Congregational, Presbyterian, and Wesleyan chapels, mostly in the Gothic style. A handsome music hall was opened in 1873. It cost upwards of £50,000, and is the largest building in the town. It was erected by a company to supply high class musical entertainments. There are two halls, the larger of which will accommodate 3000 persons, and contains an organ which cost £5000. The market-hall, or Norfolk Market, has a roof of glass and iron, and was erected by the Duke of Norfolk. The Cutlers' Hall, built in 1726, has a stone Corinthian front, and belongs to the ancient corporation of cutlers. The Corn Exchange is a handsome modern structure, with excellent accommodation. The other buildings of note are the town-hall, built in 1808; exchange and news-room; Manchester, Sheffield, and Lincoln, and Midland Railway stations; assay office (1773), savings' banks, assembly rooms, two theatres, large barracks, built in 1850, and considered the finest and best arranged in the kingdom for their size; Sheffield library (1771); Literary and Philosophical Society's music hall and museum; atheneum; Path College (1879), for the purposes of higher education; mechanics' institute, people's college, law library, public free library, school of design, public baths, Royal Free Grammar-school, founded 1603; Wesley College or Proprietary School (1837), for 250 boys; Buley's schools; Shrewsbury Hospital, for thirty-six persons, founded 1670; Hollis'

Hospital for cutlery widows, and schools, school of industry, Licensed Victuallers' Asylum; general infirmary, on a site of 31 acres; Dispensary; Eye and Ear Dispensary; West Riding Lunatic Asylum at Wadsley Park (1873); and work-houses. Free libraries were also erected at Highfield and Uppertorpe in 1876. A large block of buildings has been erected at Hanging Wood for the reception of forty-eight decayed townspeople. They comprise thirty-six almshouses and a central chapel. The first public park ever owned by the town was opened in 1871; it is about 12 acres in extent. In 1875 the Prince and Princess of Wales opened the Pith Park—35 acres in extent—which had been presented to the inhabitants by their townsman whose name it bears. The botanic gardens are situated in a most picturesque suburb, and are an object of great attraction. There are in Sheffield statues of James Montgomery, the poet, and Ebenezer Elliot, the "Corn-Law Rhyme," as well as a Crimean memorial. An elegant stone cross commemorates the severe visitation of cholera in 1832. The river Don is crossed by several bridges.

As early as the thirteenth century Sheffield was famous for the manufacture of cutlery, and it does not appear ever to have lost its reputation. The corporation of cutlery was formed in 1621, for the regulation of marks and devices to be impressed on metal goods. Until 1811 none but freemen could carry on the business of cutler in Hallamshire without obtaining a license from this corporation. For many centuries the manufacturers of Sheffield were confined almost entirely to the making of knives, scissors, scales, and sythes. Now, in addition to these, an endless variety of articles in brass, iron, and steel is produced at the many manufactures with which the town abounds. The articles of cutlery comprise razors, saws, edge tools, files, blades, forks, hammers, scales, awl-blades, augers, anvils, file-bits, bolters and cogues, buttons, cases, combs, field-pieces, grates, stoves, needles, nails, railway springs and buffers, screws, shears, snuffers, spades, spindles, spoons, optical and surgical instruments, joiners' tools, &c. Many artisans are also engaged in the manufacture of Britannia metal and electro-plated goods; glass, bone, brass, horn, ivory, porcelain, and silver ornaments; engraving and die-stamping; type-founding, and tumbling; and in the colonies and gunnery. Some of the largest establishments are the Cyclops, Atlas, Sheaf, and Park works, where steel rails for railways, armor plates, steel shot, ordnance, and heavy castings are made. The conversion of non-ferrous steel is one branch of the Sheffield trade.

Stone-masonry is extensively employed.

The vast buildings used for the drying of all kinds of tools and implements by steam-power form one of the characteristics of the town. There are many mercantile houses, some of which confine themselves to the home markets, while others export to the Continent, Brazil, the Cape of Good Hope, and especially to the United States of North America. The spring-knife and table-knife makers are the largest classes of artisans. Until recently the cutlery grinders were a very unfortunate class, owing to the injurious effect of what is called dry grinding; the dust of the stone and metal rises in clouds, and was necessarily inhaled by the workmen, the average duration of whose lives was thus very much shortened. Of late years wet grinding has been substituted for dry as much as possible, and an apparatus, consisting of a fan, has been discovered, by means of which the dust is carried by flues out of the building. These improvements have had a very beneficial effect on the health of the workmen. It is to the immense coal-bed occupying the surrounding district that Sheffield chiefly owes its prosperity. Under the Redistribution of Seats Act of 1885 Sheffield is divided into five parliamentary divisions returning one member each. The corporation consists of fifteen aldermen and forty-eight councillors. The population of the town in 1881 was 281,508.

Sheffield, the "field on the Sheaf," is of great antiquity, and was in all probability a Roman station. In the reign of the Plantagenets it was defended by a strong castle, which was destroyed during the Civil War by order of Parliament in 1646. The site is still called Castle Hill. Mary Queen of Scots was imprisoned in the Manor house, about 2 miles distant, for nearly fourteen years. The town suffered severely from the bursting of a reservoir in 1865; an immense amount of property was destroyed, and nearly 100 lives lost.

SHEIKH, a title of dignity properly belonging to the chiefs of the Arabic tribes or clans. The heads of monasteries are sometimes called sheikhs among the Mohammedans, and it is also the title of the higher order of religious persons who preach in the mosques.

SHEIL, RICHARD LALOR, an Irish orator, was born near Waterford, 17th August, 1791. He was educated at the Jesuit school of Stonyhurst, Lancashire, and at Trinity College, Dublin, where he graduated in 1811, and was called to the bar at Lincoln's Inn in 1814. Between 1814 and 1822 he produced six dramas, "Adelaide" (1816), "The Apostate" (1817), "Bellammina" (1818), "Evadne" (1819), founded on Shilley's "Traitor," "Montoni" (1820), and "The Huguenot" (1822), all of which but the last obtained a decided success. In 1822 also appeared the first of a series of "Sketches of the Irish Bar," afterwards collected and edited by R. S. Mackenzie (London, 1855), which are among his most successful literary performances. About this time he began to be known in Ireland and England as a political orator and agitator, and also by his forensic efforts. He joined the Catholic Association in 1822, and in 1825 was chosen with O'Connell to plead at the bar of the House of Commons against its suppression. In 1829 he entered Parliament, and almost immediately took his place as a most brilliant and impulsive speaker. After seconding O'Connell in the repeal agitation, he accepted a sinecure office under the Melbourne ministry, and in 1839 was made a privy councillor. He was made master of the mint by the Russell ministry, and in 1850 was appointed minister at the court of Tuscany. He died at Florence, 23rd May, 1851. His life was written by W. T. McCullagh Tonnens (London, 1855).

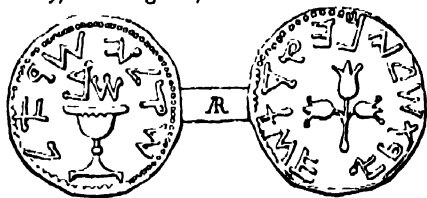
SHEK'EL (Seklas, from *shakal*, to weigh), the principal weight and coin of the Hebrews.

The Shekel as a Weight.—The almost uniform testimony of ancient authors is that the shekel was equal to the Attic tetradrachm, and to the stater, or half the Roman ounce (four denarii). The average weight of the shekels of Simon Maccabæus was about 218 English grains, or half the English avoirdupois ounce, and only two grains more than the Roman half-ounce, or the weight assigned to the shekel by ancient writers.

The shekel formed the foundation of the Hebrew weights, of which there were three principal denominations: the shekel, meaning weight; the maneh, meaning number, that is, a certain number of shekels or weights; and the kikkar, a round number or sum total, that is, a certain collection of manehs. The last weight is commonly translated by the word talent in the Septuagint, Vulgate, and Authorized versions. There is a remarkable resemblance between this system and that of the Greeks—the shekel, maneh, and kikkar corresponding respectively to the stater, mina, and talent.

The kikkar was equal to 3000 shekels (Exod. xxxviii. 25). There is a difficulty about the maneh, since from 1 Kings x. 17, compared with 2 Chron. ix. 16, it would seem to have contained 100 shekels, while in Ezekiel xlv. 12 it is ordered to contain sixty shekels. There are great difficulties in adopting the former value, and on the other hand the meaning of the passage in Ezekiel is very doubtful. If the latter value be adopted the kikkar would contain fifty

manehs. The shekel was subdivided into the beka or half-shekel, the rebu or quarter-shekel (the zuz or zusa of the Talmudists), and the gerah, or the twentieth of the shekel.



Silver Half-shekel.

There appear, however, to have been at least two standards of the shekel—the shekel of the sanctuary, and the royal or profane shekel (Exod. xxx. 13; 2 Sam. xiv. 26). The tradition of the Rabbins is, that the shekel of the sanctuary was double the profane shekel.

The Shekel as a Coin.—In the earliest mention of money in the Bible (Gen. xxiii. 16) the shekels of silver which Abraham paid to Ephron seem, from the expression “current money with the merchant,” to have been impressed with some mark, which made it *coin*, of however rude a description. The currency of the Jews from the earliest ages was silver, and the word *shekel* is the common Hebrew name for money. Gold money is first mentioned in David's reign (1 Chron. xxi. 25), and by the time of Isaiah it seems to have been common (Isaiah xlvii. 6). The amount of silver in the ordinary shekel is worth about 2s. 3½d., and that of gold in the gold shekel is about 36s. 6d.



Jewish Silver Shekel (144 n.c.)

Inscription in Samaritan: on the obverse the cup of manna and “shekel of Israel;” on the reverse the flowering rod of Aaron and “Jerusalem the Holy.”

The earliest Jewish coinage of which we have historical knowledge was that of Simon Maccabæus (1 Macc. xv. 6), which was in silver, and of which several specimens remain. The denominations of the Hebrew money were the gerah or twentieth of the shekel, which the Septuagint renders by the Greek word *obolos*, but which is nowhere expressly mentioned as a coin; the rebu or quarter-shekel (1 Sam. ix. 8); the third part of a shekel is mentioned by Nehemiah (x. 32), but it is not clear that there was a coin of this value; the beka or half-shekel, which was the poll-tax paid by every Israelite when the census was taken (Exod. xxx. 15); the shekel, which appears to have been the largest coin in use, though some understand the amount of 15, 20, and 25 shekels, mentioned in the passage of Ezekiel already quoted, to mean coins of that value; the maneh, and the kikkor or talent, were respectively sums of 60 shekels (though this, as already observed, is uncertain) and of 3600 shekels.

SHEKINAH or **SHECHINAH**, a term derived from *shachan*, to reside or rest, used in post-biblical times by the Jews, and afterwards by Christians, to express the visible presence of Jehovah, especially when resting between the cherubim over the mercy-seat of the ark. It was the belief of the Jews that Jehovah displayed his presence in the tabernacle by causing a brilliant light, veiled by a cloud, to appear over the ark, and that this appearance was continued in the temple erected by Solomon. It was supposed that, owing to the unfaithfulness of the people,

this divine token was removed, and all Jews agreed that it never appeared in the temple of Zerubbabel or that which succeeded it. In the Chaldee version of the Old Testament (Targum) the term forms a common periphrasis for Jehovah considered as dwelling among the children of Israel.

SHELDON, GILBERT, Archbishop of Canterbury, was born 19th July, 1598, at Staunton in Staffordshire. During the civil wars he adhered to the king, and on the restoration of Charles II. he obtained the mastership of the Savoy, which he kept till 1663. It was at his lodgings there that, in 1661, the famous Savoy Conference was held between some of the Episcopal clergy and some Presbyterian divines. In 1663 he was translated to the archbishopric of Canterbury, vacant by the death of Archbishop Juzon. He succeeded Lord Clarendon as Chancellor of the University of Oxford in 1667, holding the office only for two years. He died at Lambeth, 9th November, 1677.

Sheldon expended huge sums upon the episcopal houses of the sees of London and Canterbury, and particularly on the palace at Lambeth, where he rebuilt the library and made additions to its contents. At Oxford, he erected, at his sole expense, the theatre which bears his name, and where the public meetings of the university are still held.

SHELL, in gunnery. See PROJECTILE.

SHELLAC. See SHILL-LAC.

SHELL-DRAKE or **SHELDRAKE** (*Tadorna vulpanser*) is a genus of Ducks. The Common Shelldrake (*Tadorna vulpanser*) is a common species throughout Europe, extending to North Africa and Northern Asia, and to India, China, and Japan. It is common on the sandy coasts of Britain, many breeding in this country, especially on the east coast. The male is a large, handsome bird, from 24 to 26 inches in length. The head and upper part of the neck are deep green, bounded by a broad white collar, below which is a broader collar of rich chestnut, extending over part of the back; the rest of the back is white; the lower surface is white, with a broad median dark brown band; the scapulars, the primaries, and part of the secondaries are black; the inner secondaries are gray, and the speculum is a rich bronzed green; the bill is pale red, with a fleshy protuberance at its base. The female bird is rather smaller and less brightly coloured, and lacks the knob at the base of the bill. The shelldrake breeds in holes on sandy ground, often taking possession of a deserted rabbit burrow, whence one of its common names is “burrow duck.” The nest is made of a few bents of grass, and lined with soft down; it contains from twelve to fourteen eggs. The shelldrake feeds on seaweeds, molluscs, worms, insects, &c. The flesh is coarse and unpalatable. The shelldrake may be tamed, and breeds in domestication.

The Ruddy Shelldrake (*Tadorna casarca*) is an allied species, common in Europe and Central Asia, but only occasionally visiting Britain. The general colour of its plumage is bay; the quill feathers of the wing and tail are black, the wing-coverts white, and the speculum bronze-green. This species is abundant in the cold season in many parts of India, where it is known as the Brahamy Duck. It breeds freely in captivity.

SHELLEY, PERCY BYSSHE, a distinguished English poet, was born on the 4th of August, 1792, at Field Place, near Horslam, in the county of Sussex. His father, Timothy Shelley, was the son and heir of a wealthy baronet, Sir Bysshe Shelley, of Castle Goring. At ten years of age Shelley left his Sussex home for St. John's Academy, a middle-class boarding-school at Isleworth, near Brentford, and on the 29th of July, 1804, he was removed to Eton, where his shyness and gentleness, combined with his excitable temperament, rendered him a fit object for the attacks of the young tyrants which, like most schools, Eton possessed in such abundance, but where he gained the goodwill of many schoolfellows and the friendship of a few. “I always

liked him," says one of these latter, "he was such a good, generous, open-hearted fellow." "Many a long and happy walk," wrote another, "have I had with him in the beautiful neighbourhood of dear old Eton, and the picturesque churchyard where Gray is said to have written his 'Elegy.' I loved him for his kindness and affectionate ways. He had great moral courage, and feared nothing but what was base and false and low."

It was in these years of Eton life that the great consciousness came to Shelley, as it had once come to Wordsworth, that he was to be a "dedicated spirit," but the dedication in his case was one which made, not for serenity of life amid peaceful surroundings, but for infinite warfare in the storm and stress of the world.

In spite of occasional collisions with the authorities, Shelley left Eton for Oxford under circumstances altogether honourable. On 10th April, 1810, he entered his name as a student of University College, and matriculated, but returned to Eton and did not finally go into residence at Oxford until the following Michaelmas. This year saw also Shelley's first published literary efforts, some cantos of a poem called "The Wandering Jew," written in conjunction with his cousin Medwin (first printed by the Shelley Society in 1887); a volume of fugitive poetry, now quite lost to the world, printed at Horsham at the expense of Sir Bysshe; a crude and extravagant romance, "Zastrozzi," for which the boy of eighteen succeeded in persuading a London publisher to give him £10; and two small collections of verses, "Original Poetry by Victor and Cazire," "Victor" being Shelley, and "Cazire," in the opinion of Professor Dowden, his friend Edward Graham; and "Posthumous Fragments of Margaret Nicholson," a volume of burlesque poems. At the beginning of 1811 he published "St. Ihsme, or the Resurrection," a romance on the same low level as "Zastrozzi," a short poem called "An Essay on Love," and "A Poetical Essay on the Existing State of Things." Another romance, "Leonora," written in conjunction with his college friend, Thomas Jefferson Hogg, was printed, but its publication was stopped short by Shelley's expulsion from the university for the propagation of heresy. In March, 1811, a pamphlet entitled "The Necessity of Atheism" had been circulated in Oxford. The suspicion of authorship very naturally fixed itself on Shelley, who had already shown himself a keen controversialist; he was summoned before the master of his college, asked if he had written the treatise, and expelled. Then he quarrelled with his father, and lived in poverty in London, where he made the acquaintance of Harriet Westbrook, a good-looking schoolfellow of his sisters, who ultimately appealed to him to marry her, Shelley, although it is evident that he was not in love, arranged an elopement, and the child pair were married in Edinburgh on 28th August, 1811.

Before the close of the year he had published some "Lures on a Fête at Carlton House," and had written a satirical poem on the Prince Regent. In the beginning of 1812 he crossed with his wife to Ireland, threw himself ardently into the Nationalist movement for Catholic Emancipation and the Repeal of the Union, writing and circulating two pamphlets, "An Address to the Irish People," and "Proposals for an Association," also a broadside, entitled "Declaration of Rights." A few months later he was residing at Tanyllt in Wales, energetically assisting in a Faust-like project to reclaim land from the sea. Before the close of the year he had written "A Letter to Lord Ellenborough," occasioned by the sentence which the latter had passed on Mr. D. J. Eason as publisher of the third part of Paine's "Age of Reason," and a ballad called "The Devil's Walk." In 1813 he published "Queen Mab," which he afterwards described as a foolish production of his boyhood. Only two years later he revised and reconstructed the poem, under the title of "The Daemon of the World."

In 1813 he republished separately one of the notes to "Queen Mab," entitled "A Vindication of Natural Diet." Another offshoot of "Queen Mab," also culled from the notes of that poem, was "A Refutation of Deism," published at the beginning of 1811. In this year his union with his wife came to an end. She had been but a feeble reflection of himself; read bad poetry to him in a monotonous tone of voice, paid more attention to the behests of an elder sister, whom Shelley hated, than to those of her husband, and finally left his house in anger. Shelley persuaded himself that she was unfaithful to him (although there is not the slightest evidence in support of such an impression), and immediately indulged in retaliation, flying to France with Mary, the daughter of William Godwin the philosopher. Two years later Harriet, the unfortunate victim of an incompatible alliance, drowned herself in the Serpentine, and on 30th December, 1816, Shelley married Mary Godwin at St. Mildred's Church, London. On account of Shelley's profession of atheism the Westbrooks appealed to the Court of Chancery for the custody of his children, Eliza Ianthe and Charles Bysshe. Lord Eldon decided that Shelley's opinions having led to conduct which the law considered immoral, he was not entitled to the exclusive care of his children, but he was allowed to name a suitable person to whom they might be intrusted, and was to be permitted to see them once a month. Shelley soon afterwards departed for Italy and never saw them again. Charles died at an early age. Ianthe married a Mr. Esdaile, and her sons are still alive. However much we may deplore the circumstances which led to it, Shelley's union with Mary Godwin was full of good omen for him as a poet. Hitherto he had written little, if anything, of permanent worth; but now poem after poem of ever-increasing power came from his pen. "Alastor or the Spirit of Solitude" (1816); "Julian and Maddalo" (1818); "Laon and Cythna, or the Revolt of Islam" (1818); "Rosalind and Helen" (1819); "The Cenci," a tragedy (1819); "Prometheus Unbound," a lyrical drama (1819); "Œdipus Tyrannus, or Swellfoot the Tyrant" (1820); "The Witch of Atlas" (1820); "Epipsychion" (1821); "Adonais" (1821); and "Hellas," a lyrical drama (1822). In addition to these and innumerable poems published since his death, notably "The Triumph of Life" (written in 1822), we have several prose works, "A Proposal for putting Reform to the Vote" (1817); "An Address to the People on the Death of the Princess Charlotte" (1817); and "History of a Six Weeks' Tour" (1817). His "Philosophical View of Reform" (1819) has not been published, but has been described in detail by Professor Dowden (*Fortnightly Review*, November, 1886). "The Masque of Anarchy" was first published by Leigh Hunt in 1832. Shelley's review of Hogg's "Memoir of Prince Alexy Haimatoff," published in the *Critical Review* of 1814, was reprinted by the Shelley Society in 1886.

After his union with Mary Godwin his father refused to have any intercourse with him, and on old Sir Bysshe's death, in 1815, Shelley was refused admission to the house, and sat on the doorstep reading Milton's "Comus" whilst the will was being read which made him the heir to a quarter of a million of money. Then, with a handsome allowance from his father, came brighter days. He resided for some time at Marlow, but his health was bad, and in March, 1818, he left England to take up his residence in Italy. Here he resided mostly at Pisa, although Leghorn, Florence, Rome, and Ravenna were at times his resting-places. Byron, Medwin, Trelawney, and Williams were the chief friends of his Italian life, but to Shelley Mary was the sweetest and best of companions. That the union was a perfect one there is abundant evidence, and to the wife we owe it that the poet came to express himself with so much radiant power. Upon her, in July, 1822, fell the terrible blow of his sudden and tragic death. Shelley was fond of the water; once while with Leigh Hunt's little boy he was

watching paper boats speed across the pond in the Vale of Health, Hampstead, he said to young Thornton, "How much I should like that we could get into one of these boats and be shipwrecked—it would be a death more to be desired than any other." His wish was, in a sense, fulfilled. On Monday, 8th July, 1822, he set sail with his friend Edward Williams in a small sailing vessel, the *Ariel*, to cross the Gulf of Spezzia to his home at Casa Magni, near Lerici. Some days later the bodies of Shelley and Williams were found upon the beach. Their boat had been run down by a felucca in a squall. The bodies were burned on the shore in the presence of Byron, Hunt, and Trelawney. The poet's ashes were buried in the Protestant Cemetery at Rome, where Hunt placed the epitaph "Cor Cordium" on the tomb.

Shelley's life was a noble one. Born to wealth and rank, he might have elected to lead a life of selfish ease, but he saw the infinity of human suffering, and determined to throw aside all conventionality, and to endeavour in his own way to make the world happier and better and brighter. So far as he threw himself against social customs sanctified by centuries of sweet and sacred experience he failed and suffered; so far as he followed the footsteps of other great spiritual enthusiasts he succeeded. "Shelley was," says De Quincey, who, as a Tory, had little in common with the young revolutionist, "the sincerest, the most truthful of human creatures; he was also the purest." "As I call Shelley a moral man," says the great Christian poet of our age, Robert Browning, "because he was true, simple-hearted, and brave. . . . so I call him a man of religious mind." His generosity and charity were boundless. Not only did he give lavishly to Leigh Hunt, to Godwin, to all his personal friends who asked of him, but he was ever ready to help the afflicted and the suffering. On one occasion he carried a fainting woman across Hampstead Heath in vain efforts to secure her a resting-place; on another he walked home barefooted through the snow because he had given his shoes to a needy wayfarer. "Shelley," said Lord Byron to Moore, "is to my knowledge the least selfish of men; one who has made more sacrifices of his fortune and feelings for others than any man I ever heard of."

Great as a man, he is also incomparably great as a poet. When Matthew Arnold declares that his prose will stand the wear and tear of time better than his poetry, that great critic merely desires to emphasize the superlative greatness of the "Defence of Poetry," and of Shelley's letters. But Shelley's poetry has long passed out of the reach of criticism. So clearly as Shakespeare is the greatest of dramatic and Milton of epic, so surely is Shelley the greatest of our lyric poets. Such lyrics as the "Cloud" and the "Skylark" are perhaps more generally familiar than any other poems to the great mass of poetry lovers of the present generation. In addition to such as these, Shelley wrote "The Cenci," the greatest tragedy since "Lear," and "Adonais," the greatest elegiac poem since "Lycidas." "The Cenci," which has been described by Swinburne as "the one great play written in the great manner of Shakespeare's men which our literature has seen since the time of these," was first performed under the auspices of the Shelley Society in May, 1886, when Alma Murray personated Beatrice, and Herman Vezin the ruthless count. "Adonais" is an elegy on Keats, a volume of whose poems was in Shelley's pocket at his death. The "Epipsychidion," an idealization of love, recalls the "Vita Nuova" of Dante, and with the "Triumph of Life" gives the clearest evidence that, had he lived, Shelley might have written a "Divine Comedy." It has been urged by an unsympathetic critic that Shelley is "the poet of clouds and sunsets," and that his work lacks substantiality. It is true that he is the poet of clouds and sunsets, and that he has done for these what Wordsworth has done for the rocks and the ravines, the lakes and the hills of his native

county. But Shelley is much more than this; he is essentially the poet of humanity, of humanity not in its narrow environment of individual contentment, with simple dalesmen and leech-gatherers as types, but of humanity in its social aspect, struggling forward to a happier and more golden time. The exuberant hopefulness of Shelley's poetry, the ideals of a brighter future with which it abounds, entitle him above all others to be called the poet of human progress. To be this, and to leave his work as an artist untarnished, is to be great indeed. "Shelley," said Wordsworth, "is the greatest artist of us all."

Shelleyan literature is almost too abundant for enumeration. His cousin Medwin, and his friends Hogg and Peacock, have all contributed their experiences of the poet. Trelawney wrote "Recollections," in 1858, and "Records," in 1878. The authoritative Shelley Memorials, edited by Lady Shelley, have been superseded by Professor Edward Dowden's admirable life (1886), the most artistic monument erected to a poet's memory since Southey's life of Cowper. Admirable monographs of Shelley have been written by John Addington Symonds (1879), and William Michael Rossetti (1886). An anti-Shelleyan record by John Cordy Jeafferson, "The Real Shelley," has attracted much attention. This apologist of Byron and detractor of Shelley, however, admits that "Shelley took the side of the angels, because his disposition was on the whole towards goodness; Byron went with the devils, because he found them upon the whole better and more congenial company than the angels of light."

Swinburne, Stopford Brooke, and Walter Bagehot have written admirable criticisms of Shelley, and Dr. Garnett has edited a good selection from his letters. The best editions of his works are the three volumes of W. M. Rossetti, and the eight volumes of H. Buxton Forman. In 1886 a Shelley Society was founded by Dr. F. J. Fumivall, whose father knew Shelley at Marlow. This society has published many valuable reprints of Shelley's works, together with an admirable bibliography by H. Buxton Forman.

SHELLEY, MARY WOLLSTONECRAFT, the second wife of the above, and a writer of fiction, was born in London, August, 30th 1797. Her father was William Godwin, the author of "Political Justice," her mother, Mary Wollstonecraft, the author of the "Rights of Woman," who died at her daughter's birth; in 1816, she wrote "Frankenstein," a most remarkable novel for a girl of nineteen to have produced. This was followed by "Valperga" (1823), "The Last Man" (1826), "The Fortunes of Perkin Warbeck" (1830), "Lodore" (1835), practically an account of her husband's early life, and "Falkner" (1837). Besides these novels, she wrote a "Journal of a Six Weeks' Tour," "Rambles in Germany and Italy," and (excepting Tasso and Galileo) the Italian and Spanish lives for Lardner's Encyclopedia, and edited her husband's prose and poetry. On Shelley's death in 1822, she returned to London, where at first she supported herself by literature, although ultimately Sir Timothy Shelley made her an allowance. She was an affectionate mother, and shared the fortune of her son when he succeeded to the baronetcy in 1844. She died in 1851, and is buried by the side of her father in Bournemouth churchyard. Sir Percy Florence Shelley, of Boscombe Manor, Bournemouth, has raised a beautiful monument to his parents in the parish church of Christchurch, the rector of Bournemouth having refused his consent to its erection in his church.

SHELL-LAC or **SHELLAC** is the product of the lac-insect (*Coccus lacca*), which in many respects resembles the cochineal insect (*Coccus cacti*), but differs in the important point that its males alone, and they only in their most mature stage, have wings. The females are 5000 times as numerous as the males. The insect has therefore but little power of locomotion. Colonies of lac-insects cluster on the twigs of trees, especially of Buten, Ficus, and

Croton, and having punctured them live in and feed upon the resinous swellings which ensue. Their gluttony causes their death, for they become fixed or glued by the superfluous excretion, and their dead bodies form a roof over the eggs which they have laid. These eggs coming to maturity let out a fresh colony, which proceeds further along the branch to a tender spot, where it repeats the life-history of its parents.

The small twigs are gathered and soaked in hot water by the natives of Sum, Assam, Burma, and Bengal, the chief lac-producing countries, and the heat melts out the resin. This is then wrapped in bags and melted near a fire, so as to strain it coarsely by squeezing it through the bags. It is allowed to flow out in sheets or shells and hardened, and when broken into suitable fragments forms the *shell-lac* of commerce. That which drops from the bags without passing on to the trays to form shell-lac is the *button-lac* of commerce. *Stuck-lac* is the twigs themselves broken into small pieces. *Seed-lac* is lac which has been collected at the foot of the trees naturally dropped from the branches. *Lac dye* is made by evaporating the water in which the lac is first melted, when much colouring matter is parted with; it is a favourite scarlet dye, and is much used in dyeing the uniforms of our own army.

The uses of shell-lac are very various, the most familiar being the manufacture of French polish by dissolving shell-lac in spirits of wine, and the manufacture of various varnishes, lacquers, and fine sealing wax. Over 1500 tons of lac in its various forms, and nearly half as much lac dye, are annually imported.

SHELTA is a Celtic language, surviving only as a sort of slang dialect especially peculiar to tinkers, but more or less known by many tramps and vagabonds. Celtic scholars find fragments of Shelta familiarly spoken by the "Arabs" of the London streets. It is commonly much associated with Gypsy or Romany, or is itself an adulteration of that tongue, and is not usually met with in any purity, as may be well imagined. Tramps who do not know it dislike it because of its difficulty, as it strongly resembles Old-Irish or Erse in structure, and has little apparent likeness with the speech of to-day. Professor Palmer collected over a hundred words of it, when it appeared that though undoubtedly Celtic, it was quite as undoubtedly not Erse. Since then Shelta-speaking tinkers have been found, and a much more extended vocabulary has been made. The travelling tinkers were a closely-knit body, with other peculiar customs besides the use of Shelta, which they preserved to the time of railways, when increased facilities of communication broke them up. The Celtic scholar who has given most serious study to Shelta as yet is Mr. C. G. Leland, whose paper on the "Original Gypsies" at the Oriental Congress in Vienna, November, 1886, contains many curious information on the subject of Shelta. It has been generally suggested that as the tinkers of Great Britain may be the descendants of the old bronze-workers, so their tongue may have come down to us from prehistoric times. It covers have shown that the early bronze-smiths were nomadic, and that they went about from village to village making and selling new objects and buying up old and broken ware to melt and re-mould. The bronze-workers' craft was closely connected with that of the jeweller, in most cases both were exercised by the same person. His wares were immensely valuable in those days, out of all proportion to the present worth of such objects. Therefore, the bronze-smiths must have travelled in large bands for mutual protection. Nothing is more likely than that they formed, in time, a community with distinct laws and language. Nor is it improbable that this was transmitted to the tinkers. It takes a long time for men to form a distinct class with a separate tongue. The Celtic tinkers of England are unanimous in claiming for their class or clan a very great antiquity: and when we find in the

same country two nomadic classes of men, pursuing the same calling of working in metal, though separated by a long historical interregnum, we may rationally surmise that they had a common origin and a common language.

SHEMITIC. See SEMITIC.

SHENSTONE, WILLIAM, was born November, 1714, at the Leasowes, Hales Owen, Shropshire—a fragment of this county imbedded in Worcestershire. He was sent to Pembroke College, Oxford, in 1732, but took no degree. He amused himself in travelling about and writing poetry till 1745, when he commenced residing on his patrimony at his native place. The remainder of his life was spent in adorning his grounds at the Leasowes and in rural occupations. He died 11th February, 1763. The estate hardly fetched enough to pay the debts he had incurred in embellishing it. His poems consist of elegies, pastorals, odes, &c. "The Schoolmistress" is the best of his productions. This kindly and humorous poem appeared in 1742, though it was in great part written in 1736. It consists of some forty Spenserian stanzas, a little affectedly antique, but with many admirable points. Its quaint portraiture of the village school-dame is genuine and life-like, and gives us to the full as much pleasure as it did those for whom it was written. One other production of Shenstone's keeps his fame alive. It is the oft-quoted stanza, from a short poem in the ballad metre of which he was so fond, written impromptu in an inn at Henley—

"Whoe'er has travelled life's dull round,
Where'er his stages may have been,
May sigh to think he still has found
The warmest welcome at an inn."

SHE'OL (Heb., cavity, from *shaal*, to dig) is the Hebrew word used in the original text of the Old Testament to designate the mysterious underworld which formed the abode of the spirits of men after death, the rephaim or giants, and certain evil spirits. See HELL.

SHEPHERD KINGS, THE (in Egyptian *Hyksos* or *Hikshos*), two dynasties of strangers and usurpers who conquered the Pharaohs and reigned over Lower Egypt for a period of about 500 years. They were supposed by some writers to have been of Phœnician, by others of Arabian origin, and to have invaded Lower Egypt about 2000 years B.C. They captured Memphis, and afterwards gradually extended their conquests into the interior. Their whole history is involved in doubt and confusion, but it seems certain that their oppressions finally provoked a rebellion among their subjects, who were assisted by Aahmes or Amasis, the king of Upper Egypt, to expel them (about B.C. 1591). Both Upper and Lower Egypt were then united under one sovereign. The chief interest of the Hyksos to us is that it is now generally held that Abraham went to Egypt during their first dynasty, and Joseph in the second. The Exodus probably took place in their time.

SHEPHERD'S PIPE, a name often given to the musette, that is, to the pipe, not the bagpipe, form of that instrument. See the article MUSETTE.

SHEPHERD'S PURSE (*Capsella Bursa-pastoris*) is a common annual weed belonging to the order of plants CRUCIFERÆ. It is a native of Europe, but has accompanied Europeans in all their migrations, and has established itself nearly all over the world. In England it is an abundant and troublesome weed, common on roadsides as well as in the richest soil. It varies greatly in size, from a few inches to 2 feet in height. The leaves are very variously divided, but the lower leaves form a rosette closely pressed to the ground. The flowers are white and very small. The purses or pouches, from which the common name is derived, are the laterally compressed heart-shaped pods, which, when ripe, separate into two bont-shaped valves, each inclosing numerous yellow seeds. The shepherd's purse is less acid than most of its tribe, and was formerly used as a pot herb.

SHEPPEY, ISLE OF (Saxon *Sceapige*, the island of sheep), a portion of the county of Kent, insulated from the mainland by an arm of the Medway, called the Swale. It is 9 miles long and 4 miles broad. Its principal formation is the London clay, which, on its eastern coast, rises into cliffs 70 or 80 feet high. Its most interesting antiquities are Minster Church and the scanty remains of Queenborough Castle. The chief town is **SHEERNESS**. A great portion of the island is laid out in pasturage. The island is gradually being worn away, and the Minster Church, which is said to have been in the middle of the island half a century ago, is now only half a mile from the shore. The geological interest is great, for the whole island is one extinct garden of fossil vegetation of Eocene age. At Shellness, its most easterly point, James II. was seized when endeavouring to escape to France in 1688. The population of the island in 1881 (including Sheerness) was 18,115.

SHEPTON MALLET, a market-town of England, in the county of Somerset, and a station on the Great Western and South-western railways, lies at the foot of the Mendip Hills, 129½ miles from London and 4½ from Wells, in a valley watered by the Dulcote, a small feeder of the Brue. It is irregularly laid out, but the High Street and others are well built. The town is very ancient, being on the Roman Fosse-way, and is described in the Domesday survey as *Septon*. Many interesting Roman and other antiquities have been discovered in its neighbourhood, and on the summit of the Mendips, 2½ miles distant, is an old encampment, called *Maesbury* or *Masbury Ring*. From this spot a magnificent view of a very extensive tract of country may be obtained. The parish church of St. Peter and St. Paul, which is large and handsome, has two stained glass memorial windows, and an unusually rich wooden roof. At the west end is a fine Tannton tower, covered with an incomplete spire, 90 feet high. There are also Congregational, Wesleyan, Baptist, Unitarian, and Roman Catholic chapels. Among the other objects worthy of notice are a handsome market-cross, a well-endowed grammar-school, a large and convenient cemetery, several almshouses, a handsome court-house for police and magisterial purposes, the county gaol, some large breweries and extensive cheese stores, a music hall, mechanics' institute, two banks, and a district hospital, established in 1867. The inhabitants are supplied with abundance of good water, obtained from a spring under the Mendip Hills, and conveyed about a mile and a half in pipes. The manufactures of crape and silk are considerable, and there is also an active trade in cheese, butter, and other agricultural produce. About 2 miles east of the town are the freestone quarries of Doulting, from which Wells Cathedral was built, and which is now extensively used in all parts of the west of England. The hamlet of Oakhill, which is in the parish of Shepton Mallet, on the opposite side of the Mendip Hills, contains a tastefully-built district church and a large brewery, which has acquired a wide reputation for its porter. The population in 1881 was 5322.

SHERBORNE, a town of England, in the county of Dorset, pleasantly situated, partly on an acclivity and partly in a vale, on the small river Ivel, an affluent of the Yeot, the ancient *scire burn* (clear brook), which flows at the foot of the gentle hill as in the days when King Ine (705) planted here an episcopate, which endured for nearly 400 years, until, having been shorn of territory and power by the separation of various other sees, the bishopric was, in 1078, removed to Old Sarum, whence in 1225 it was again transferred to Salisbury. Sherborne is about 17 miles north by west from Dorchester, and 117 miles W.S.W. of London by the South-western Railway. The town is compact and well built, has a good supply of water, and is well drained. There are some manufactures of gloves, and

a silk factory. The church is a large structure, which belonged to the abbey, and exhibits various styles of architecture. It has a central tower 150 feet high, restored in 1884-85. The building was thoroughly restored in 1848-58, and is one of the most splendid edifices in the south of England. There are places of worship for dissenters, a well-endowed grammar and other schools, and an almshouse. The grammar-school originated in the beneficence of the sixth Edward, and has grown to such proportions that it is now one of the great public foundations of the kingdom. It occupies what is left of the remains of the abbey proper, and the buildings were largely added to in an appropriate style in 1881. The remains of the castle are on a rocky eminence at the east end of the town. It stood a siege in the wars between Stephen and Maud. Sir Walter Raleigh became its possessor, and built the centre of the present mansion, where his arms may yet be seen. Sherborne is one of the dozen places where Raleigh is said to have smoked the first pipe of tobacco. The population of the town in 1881 was 5636.

SHERIDAN, RICHARD BRINSLEY BUTLER, a distinguished dramatist and parliamentary orator, was born in Dublin in September, 1751, of a family which has also other claims to distinction. His grandfather, Thomas Sheridan (1681-1738), was the favourite companion of Dean Swift, and wrote a treatise on the "Art of Punning." Brinsley's father, Thomas Sheridan (1721-88), was a writer and lecturer on elocution, who published a treatise on education, a "Pronouncing Dictionary of the English Language," and a "Life of Swift." His mother, Frances Sheridan (1721-66), was the author of two novels, "Sidney Biddulph" and "Novelists," and two plays, "The Discovery" and "The Dupe." Mrs. Sheridan described her son at the age of seven as "an impenetrable dunce." The father seems to have made sufficient money as a lecturer, having noblemen and cabinet ministers as his pupils, to send his two boys to Harrow, where, in conjunction with another boy, Richard Brinsley wrote a farce called "Jupiter." His school life at an end he went to live at Bath, where he lost his heart to the beautiful Elizabeth Linley, who was piana donna at her father's concerts. Young Sheridan carried her off from all restraints, married her secretly at Calais, and a year afterwards (1773) publicly at Bath, the bridegroom being twenty-two and the bride nineteen. The £3000 which came to Miss Linley as dowry formed their sole income for some years, except when the young wife sang at concerts, and this the husband rarely sanctioned. A cottage at East Burnham and afterwards a house in London seem to have been kept up on this very timely dowry for three years, when Sheridan produced his comedy of the "Rivals" at Covent Garden Theatre (17th January, 1775). The play was a brilliant success, and to this Mrs. Malaprop's extraordinary "derangement of epitaphs" must have contributed in no small degree. In the same year he wrote a farce called "St. Patrick's Day, or the Scheming Lieutenant," and an opera, the "Duenna," which was also produced at Covent Garden and had a most exceptional run.

At the end of this year (1775) Garrick, who had made a fortune as lessee and manager of Drury Lane Theatre, determined to retire, and negotiated for Sheridan to succeed him. No one has discovered where the young dramatist found the money, probably it was lent by Garrick, who at any rate did not display his customary insight, as Sheridan proved a most extravagant lessee and an incompetent manager. In spite of this extravagance and incompetence he lived as the companion of princes and statesmen for many years, although a crash was inevitable. A theatre was a splendid property in an age in which London boasted but two rival houses. His lesseeship commenced in 1776, and Sheridan remodelled for his theatre a play of Vanbrugh's, which he called a "Trip to

Scarborough." A year later, in May 1777, the "School for Scandal" was produced, a play which for more than a century has held its own as the most popular of English comedies. This play revolted the pure earnest spirit of Shelley, who complained that it "associated virtue with bottles and glasses, and villany with books," but in spite of the truth in such a judgment one may urge that it has given abundance of innocent pleasure and relief to three generations. The "Critic" was published in the same year as the "School for Scandal." During this period of management and play-writing Garrick died, and Sheridan wrote a monody which was read for some nights on the stage. In 1780 Sheridan entered Parliament as member for Stafford. "Paid 248 guineas five guineas each" is the very concise account of his election expenses. A petition against his return came to nothing. His first speech, like that of a literate statesman with whom he had much in common, was a failure. "I am sorry to say I do not think this is your line," said a friend, "you had much better have stuck to your former pursuits." Sheridan replied: "It is in me, however, and, by God, it shall come out." And so it did. Uniting himself with Burke and Fox and the other great Whig leaders, he became an under-secretary of state in the Rockingham ministry which followed the overthrow of Lord North. A year later he became secretary of the treasury, but his great parliamentary triumph was his five hours' speech on the impeachment of Warren Hastings. Here is an account of the influence which it exercised:—"The late Mr. Logan, author of a most masterly defence of Hastings, went that day to the House of Commons prepossessed for the accused, and against the accuser. At the expiration of the first hour he said to a friend, 'All this is declamatory as action without proof'; when the second hour was finished 'This is a most wonderful oration'; At the close of the third, 'Mr. Hastings has acted most unjustifiably'; the fourth, 'Mr. Hastings is a most atrocious criminal,' and at last, 'Of all monsters of iniquity, the most enormous is Warren Hastings'." The House adjourned to calm itself, but, as Pitt said "under the wand of the enchanter." Yet another great speech on the same subject, which Burke thought still more eloquent, and Sheridan had run himself down as a matter of a few years earlier he appeared to have exhausted himself as a dramatist. In 1792 his wife died, and after this all seemed to go wrong with him. His theatre fell to pieces, and had to be rebuilt. At the reopening in 1794 he produced an extravaganza called "The Glorious First of June." He afterwards adapted Kotzebue's "Stratagem," and wrote his somewhat stilted tragedy "Pizarro." At forty-four years of age he married for the second time, and his only child was a girl of nineteen.

The latter years of his life were very sad, although for the first reason of providence and weakness of will were most to be regretted. For a few months he was a member of Fox's administration as secretary to the navy, but Fox's death prevented it from doing his parliamentary career. His connection with the Prince, afterwards George IV., did not save him from the contemptuous neglect with which that worthy tried to deal with associates after he became Regent. In 1800 Drury Lane Theatre, so recently rebuilt, was burned to the ground. The blaze was seen from the House of Commons, and someone who loved the achievement Sheridan opposed, saying: "Whatever might be the extent of the calamity, he hoped it would not interfere with the public business of the country." Leaving the assembly he was found drinking at a coffee-house in Covent Garden. "Surely," he said, "a man may drink a glass of wine by his own fire-side."

The theatre was rebuilt, but Sheridan had no voice in its management and was utterly ruined. He lost his seat for Stafford, which alone secured him from arrest for debt, and during his later years he was the prey of duns and creditors, who gave him no peace. Once he was imprisoned

in a "sponging-house" for three days, and after this his spirit was entirely broken. When told that young Lord Byron had praised him as the writer of the best comedy, the best opera, and the best oration of his time, perhaps the soundest criticism to which Byron ever gave expression, he burst into tears. He died in the extremest poverty, with bailiffs in the house, which had been denuded of furniture and carpets, on the 7th of July, 1816. Too late to do him any good his countrymen discovered that they had lost a man of genius. He was buried in Westminster Abbey with much pomp, princes and dukes acting as pall-bearers.

The accredited life of Sheridan for many years was that by the poet Moore, but this has been superseded by Mrs. Oliphant's admirable little biography in Macmillan's English Men of Letters Series. There are many expensive editions of Sheridan's works; the best cheap edition is in Bohn's Library. Professor Henry Morley's edition of the plays in his Universal Library is a well-arranged volume.

SHERIFF, the Shire-Reve (*scir-gerefa*), from the Saxon word *reafan*, to levy, whence also *grere*. The German word is *graf*. The sheriff was the royal officer. In Old English times, before the Norman conquest, the prince or king employed in the shires or larger districts his *gerefa* or reeve, who levied his dues, fines, and amercements; to whom his writs were addressed; who exercised on his behalf regal rights in the shire, for the preservation of the peace and the punishment of offenders; presided over the courts-leet or views of frank-pledge, and (at least in the absence of the earl in ancient times, and since the Conquest instead of the earl) presided over the hundred and county courts. The ealdorman or alderman was the national officer, head of the shire, appointed by king and council; and the earl of later times was developed from the ealdorman.

The statute 28 Edward I. c. 8, which says that "the king hath granted unto his people that they shall have election of their sheriff in every shire (where the sheriff is not fixed in fee) if they list," is evidently declaratory of a new privilege.

At present the crown has returned to the original view, and in most cases annually appoints the sheriffs, and also fills up any vacancy which is occasioned by the death of a sheriff during his year of office. To some corporations of cities which are counties of themselves charters have given the power to elect their own sheriffs; and the city of London has the perpetual right to elect the sheriffs of Middlesex. In the county of Durham the bishop was sheriff until he was deprived of palatine powers in 1836.

The sheriff derives his authority from two patents, one of which commits to him the custody of the county, and the other commands the inhabitants to aid him. He takes an oath of office, the greater part of which relates to his collection of the crown revenue, and he gives security to the crown that he will duly account for it. He presides in his own court as a judge, and he not only tries all causes of 40s. in value, but also much larger questions under the writ of *scire facias*. By Magna Carta he is prohibited from holding pleas of the crown. He presides at all elections of members of Parliament for the county and coroners. He apprehends all wrong-doers. He defends the county against riot or rebellion or invasion, and to this end may require the assistance of all persons in it who are more than fifteen years of age, and who, when thus assembled under the sheriff's command, are called the *posse comitatus*. The sheriff takes precedence of all persons in the county. He seizes all lands which have fallen to the crown, and levies all fines and forfeitures, but he is not permitted to act as a justice of the peace. He executes all writs that issue from the superior courts, whether they are writs that commence an action or writs of execution; he is likewise responsible for the execution of criminals. He receives and entertains

the judges of assize, on whom he is constantly in attendance whilst they remain in his shire.

To assist him in the performance of his duties the sheriff employs an under-sheriff and also a bailiff and gaolers, from whom he takes security for their good conduct. He is prohibited by very ancient statutes from selling his office or the profits of any part of it.

In Scotland the sheriff exercises an extensive judicial authority, and a large portion of the general litigation of the county proceeds before this class of local judges.

SHERRY (from *Xeres*), a generic name for white wines produced in the district of Cadiz in Spain. The principal vineyards are situated near Xeres de la Frontera, the soil there, composed of carbonates of lime and magnesia mixed with clay, yielding the finest quality of sherry. A full sherry vintage averages about 50,000 butts. The annual shipments from Cadiz and Puerto de St. Maria, however, greatly exceed this amount, and the difference is accounted for by the fact that wines are forwarded from other parts of Spain to be made up for export as genuine sherries. Pure sherry is a pale, thin, dry wine, and among the finest kinds are *Vino Fino*, *Amontillado*, and *Manzanilla*. These, however, are for the most part retained at Cadiz to form *Solera* or *old-mother-wine*, which is added to inferior wines to induce etherification and improve their quality. The varieties of sherry imported into Great Britain vary very much in colour, body, and taste. All export sherry is fortified with brandy or alcohol. A facitious wine called *Hambro*' Sherry is extensively imported into Great Britain from Germany.

SHETLAND ISLES are the most remote and northern group of islands incorporated with Great Britain. They are situated about 150 miles from the headland of Buchan Ness on the Aberdeen coast, and are nearly 100 miles beyond the centre of the Orkney Islands. Excluding the two detached islands of the group, called Foula and Fair Isle, the Shetland Islands lie between 59° 48' and 60° 52' N. lat., and between 52° and 1° 57' W. lon. Foula is 20 miles west of the Mainland of Shetland, and Fair Isle 25 miles S.S.W. of the nearest headland of the Mainland.

The group consists of more than 100 islands, islets, holms, and skerries, twenty-nine of which are inhabited; the others are either small verdant isles, on which cattle and sheep are pastured, or sterile masses of rock. The total land area is 352,876 acres. The largest of the islands, called Mainland, is about 55 miles long, and its breadth generally varies from 3 to 10 miles, but at one part is 21 miles. The coasts are singularly irregular and broken, being indented with innumerable arms of the sea or deep bays, universally distinguished by the local term of *roes*, which penetrate into and intersect the interior parts of the island in a singular manner. Mainland contains two-thirds of the population of the whole group. The valleys in it all extend north and south, and are interspersed with many small lakes. The next largest island is Yell, being about 20 miles in length and 6 in breadth. Unst is the third in size, and is about 11 miles long and 6 broad. The other islands are comparatively small.

The group is included in the county of Orkney and Shetland. [See ORKNEY ISLANDS.] The population in 1881 was 29,705, the females exceeding the males by no less than 4393. This difference is chiefly caused by the large number of men who were away fishing at the time of the census.

The general appearance of the Shetland Islands, as seen from the sea, is a heavy and unvarying line of abrupt coast. Roeness Hill, with an altitude of 1500 feet, is the highest point. The surface is particularly rugged and wild, and not unfrequently bears the appearance of desolation and sterility. Tracts of cultivated and fertile land, generally near the coasts and the sea-coasts, with rich pastures and

bright green meadows, are pleasing exceptions to this general character of the country, and the majestic cliffs and towering headlands that frown over the stormy seas, the numerous detached pyramids of rock, and the openings of innumerable lofty caverns are, either separately or grouped together, very magnificent and highly picturesque features. The islands are sometimes called "the skeleton of a departed country," the more destructible portions of which have been worn away by the force of the Atlantic. The storms in winter are frequently very severe, and immense masses of rock are often detached from the cliffs. There are four lighthouses distributed over the group.

The agriculture and rural economy of the Shetland Isles have been at all times conducted in a primitive and rude manner, but improvements have been effected and some good roads made. The culture of the soil is a secondary consideration both to landlords and tenants, who direct their attention chiefly to the prosecution of the valuable fisheries in their neighbourhood; consequently the small tenants, all of whom are fishermen, have only just enough arable land to enable them to raise a scanty supply of food for themselves and their families. The principal labour on their land is performed by the women, so as to allow the men to devote the best part of their time to fishing. The "truck" system formerly existed among the islanders, but since attention was called to it, it has almost ceased. The cottages are of mud, surrounded by peat or stone dykes. Peat is used for fuel. Oats, potatoes, turnips, and bere are raised, but the supply of corn is always insufficient. The islands contain about 12,000 hardy native ponies, called shelties, large numbers of which are annually exported. Rabbits and wild fowl are abundant everywhere. The principal fish taken on the coast are the herring, cod, sillock, and ling. Seals and bottle-nosed whales are also occasionally caught. The streams are favourable to trout fishing, and a close season was introduced in 1883. The imports consist chiefly of corn, tea, tobacco, spirits, sugar, and cotton and woollen goods. The exports are cattle and ponies, eggs, butter, rabbit skins, feathers, strawplait, fish, and chromite of iron, found chiefly in Unst. There is weekly steam communication with Granton, and cargoes of salt fish are sent direct to Spain and other countries. All the timber required in the islands is brought from Norway. The only manufactures carried on are strawplait and woollen stockings, gloves, and shawls, all hand-made. Some of the latter are produced of extraordinary fineness.

The geology of the Shetland Isles presents many points of great interest. The rocks of igneous or metamorphic origin are gneiss, granite, syenite, and traps, quartzite, mica slate, clay slate, and hornblende slate. Those of aqueous origin are old red sandstone and limestone. The great tongue which stretches from the body of the Mainland, to the north of Lerwick, in a southern direction to Sumburgh Head, consists of clay slate on the west, fringed with a broad band of old red sandstone on the east, rich in fossils. On the west of this tongue a number of small gneissose isles occur. The quartzite lies on the west, and stretches into the centre almost of the Mainland. Long narrow patches of limestone are met with in Mainland and in Unst. The island of Yell is formed of gneiss, and Unst chiefly of serpentine and diallage rock. The island of Foula is composed of high hills of sandstone, with clay and mica slate, gneiss, and granite on its north-eastern shores; and Fair Isle also chiefly consists of sandstone.

The islands are subject to severe and long continued storms, and while winter may be said to commence in the month of October, the return of spring is almost unperceptible till the end of April. The climate throughout the year is variable and humid, but to the native it is decidedly healthy, and instances of great longevity are not uncommon. Neither frost nor snow lasts long in winter.

In the high latitude of Shetland the light of day at mid-

summer never totally disappears, and the smallest print can be read at midnight. During winter the nights are proportionally long and dreary, and in the month of December the sun is not above the horizon more than five hours and twenty minutes, but the aurora borealis is often very brilliant at that season.

History.—Much learning has been advanced to connect the Thule of Tacitus ("Agricola," c. 10) with Shetland. The prevailing belief now is that Thule is the same as Foula, one of the Shetlands, and the only one of them which, from the altitude of its hills and its detached position, might have been seen from the sea immediately to the north of the Orkneys when the Romans circumnavigated Britain.

In the ninth century Shetland and Orkney became subject to Norway. The country was peopled by Northmen, and their laws, language, usages, and manners were soon firmly established. About the year 1380 a Scottish nobleman, Henry Sinclair, obtained the cession of Orkney, which included Shetland, from the King of Denmark and Norway, and it continued in his family for about a century under the sovereignty of Norway. In the year 1469 James III. of Scotland married Margaret, the daughter of Christiern, king of Denmark, and with her he was to get a dowry of 60,000 florins, of which it was agreed that 10,000 florins should be paid at once, and that the Orkney Islands should remain in the possession of the Scottish king until the remaining part of the marriage portion should be forthcoming. The Danish king, however, only paid 2000 florins, and for the remaining 8000 he further engaged that the Shetland Isles, which along with the Orkneys, as to further part of the money was ever paid, have been attached since that time to the kingdom of Scotland. The Norwegian laws and usages continued in full force in Shetland until a comparatively recent period, together with several rules and customs arising from the detached and peculiar situation of Shetland, which were also respected as laws. The inhabitants, it is stated, did not embrace Christianity till the thirteenth century, but their condition and education are now generally superior to that of the population of the northern portion of the mainland of Scotland. The islands form a synod of the Scottish Church, and with the Orkneys, send one member to the House of Commons. Scandinavian antiquities are numerous in the group, and on Lather are the vestiges of a Roman camp.

At an early period Shetland was called Haddland ("the high land") and Yakkland, which afterwards became changed into Yelland and Zeland, and from this last name Lord Dundas, one of the leading proprietors in Orkney and Shetland, took the title of Earl of Zeland in 1838, when he raised to that rank in the peerage.

Lerwick, the only town in the islands, stands on Bressa Sound, on the east side of Mainland, and has one of the best harbours in Shetland. It is the seat of the courts of law, custom-house, &c., and in its vicinity is Fort Charlotte, now used as a prison, court-house, &c. The bay opposite the port is the common rendezvous of the vessels proceeding to the northern whale fishery. English is spoken with a soft accent, and many Norse words and expressions are used.

SHETLANDS, NEW SOUTH, a group of islands, 550 miles S.S.W. of Cape Horn, between the South Atlantic and Pacific Oceans, consisting of twelve principal islands, the largest, Smith (with Mount Foster, 6600 feet), Livingstone, Nelson, King George, Elephant, and Clarence (highest point, 4557 feet), with a number of rocky islets. With the exception of a species of moss they are totally destitute of vegetation, being mountains, volcanic, and covered with ice and snow to the sea-level at all times, though in latitude only one degree greater than St. Petersburg; where is at Spitzbergen, in 60° lat. the snow line is elevated several hundred feet.

SHEWBREAD (Heb. *lechem pánim*, bread of the face or faces), the name given to twelve loaves of bread which were constantly displayed on a golden table in the holy places of the Jewish tabernacle and temple. The table on which they were displayed was of wood, plated with gold, and fitted with a golden ledge or border. The loaves were sprinkled with incense, and changed every Sabbath, the old loaves being eaten by the priests in the Holy Place. The table of the second temple was carried off by Antiochos Epiphanès, and a new one was made under the direction of the Maccabees. Later, Ptolemy Philadelphos presented the temple with a magnificent table, and a representation of the table used in the Herodian temple is still to be seen on the arch of Titus at Rome. The significance of the rite of presenting the shewbread is left wholly unexplained in Scripture, and both Jewish and Christian scholars are greatly divided as to its use and meaning.

SHIBBOLETH (Heb.), in Scripture history, a word which was made the criterion of distinction between the Ephraimites and the Gileadites—the former not being able to sound the *sh*, but pronouncing the word *sibboleth* (Judges xii. 5). It is related that those Israelites who dwelt beyond Jordan had gained a great victory over the Ammonites, when the Ephraimites demanded part of the spoil. This being refused, the latter quarrelled with them, and the Gileadites being exasperated fought and defeated them. They then secured all the passes; and when an Ephraimite attempted to cross the river they asked him if he was of Ephraim? If he said No, they bade him pronounce the word *shibboleth*, and if he pronounced it *sibboleth*, they immediately killed him. The word in Hebrew has two meanings, (1) an ear of corn, (2) a stream or flood; and it was probably in its latter sense that it was used by the Gileadites who held the fords. The striking narrative connected with this word has given it a second life in the English language, where it represents any peculiarity of opinion, practice, or utterance which is used as a text by the adherents of a party or sect.

SHIELD, a piece of ancient armour designed to ward off the strokes of the sword and missiles. Shields were borne on the left arm, were of different forms and sizes, and were accordingly designated by different names. Some were made of wood or osiers, covered over with many layers of hide. On the centre of the outer side, usually bearing a metal rim or metal plate, was a projection which the Greeks called *omphalos* (navel), and the Latins *umbo*. The object of this was to cause the missiles to glance off. In the inner side there was a band of metal or leather, extending from rim to rim, by which the shield was hung on the arm, the hand being extended to grasp the thong which extended in loops round the inner edge. In Homer some shields are described as ornamented with splendid designs in metal works (see the description of the shield of Achilles in the Iliad). The Greek shields were sometimes square, but more usually round. The beautiful crescent-shaped shields of the archers were called *pellai*. In statuary the Amazons always carry the *pellos*. The Roman legionaries carried the round *clipeus* and *parma* in the front rank, and the four-cornered *scutum*, like a half cylinder, 4 feet high by 2½ feet wide, for the rest of the legion. European nations continued to carry shields till they were rendered useless by the introduction of fire-arms.

SHIELD, WILLIAM, an English musical composer of extraordinary merit, was born at Swallowell, in Durham, in 1718, and died in London in 1829. He is buried in Westminster Abbey. There are few amateurs who do not know at least half a dozen pieces of Shield, so that his memory is kept green. The fine tenor song called "The Thorn," and the equally fine bass song "The Wolf," the "Aethusa," the "Curly-headed Ploughboy," and the altogether exquisite trio, "Oh Happy Fair," with its in-

defensible alteration of Shakspeare's sense—who does not know them, and knowing them, who does not esteem them as among the gems of native art?

Shield was originally a boatbuilder's apprentice, but he got lessons in musical theory from Charles Avison, and studied the violin to such purpose that he was able to lead a local orchestra. Eventually he drifted to London to the opera band, in 1772, and soon became principal viola player, a post he held for eighteen years. In 1778 he was appointed composer to Covent Garden, and retained this office till 1797. He was honoured with the friendship of Haydn when he visited England. Shield wrote a large number of small operas, and the incidental music for farces, ballets, and pantomimes, most of which has of course perished, but some has maintained its vitality to our day. Had Shield not been such a busy man over these necessary but ephemeral works, his fine invention and originality might have left us greater store of masterpieces.

SHIELDS, NORTH, a market-town and port of England, in the county of Northumberland, which is included in the borough of **TYNEMOUTH**, and is 274 miles from London by rail, extends about a mile along the north bank of the Tyne. The old part consists of narrow streets and alleys; the modern part has spacious streets and squares, and the town has now an extensive drainage system, a good supply of water, and a people's park. The chief modern buildings are several churches, town-hall, custom house, theatre, and mechanics' institute. The great trade of the place is from the collieries. Shipbuilding is actively carried on, and there are rope, mast, and block yards, large iron-foundries, machine shops, tobacco manufactories, and salt works. At Whitley Links, near the town, the Prudhoe Convalescent Home, for 100 inmates, was erected in 1869 at a cost of £20,000, as a memorial to Algernon, fourth duke of Northumberland. The harbour has been greatly improved, and is now accessible to vessels of any size. The population in 1881 was 20,281. The Shields take their names from the fishermen's *shields*, or *shillings*, or wooden huts which stood here.

SHIELDS, SOUTH, a parliamentary borough and seaport of England, in the county of Durham, situated on the south side of the Tyne, at its mouth, 9 miles east of Newcastle, 6 north of Sunderland, and 268 from London by the Great Northern Railway. It is exactly opposite North Shields, and a steam-ferry for passengers and carriages plies day and night between them. The town, which has risen into importance with the extension of the coal-trade in modern times, formerly consisted of a long and narrow street running parallel to the river. The modern portion is extensive and conveniently built. The town-hall, two theatres, Master Mariners' Asylum, public library, literary and scientific institution, and custom-house, are the principal buildings. The market-place, in which is a spacious market house, is a square of two acres, surrounded by valuable shops and houses. There are several churches and chapels, and in 1868 a very handsome building was opened as a free college, for the purpose of instructing seamen in navigation. It was founded in pursuance of the will of a medical gentleman of the town named Winterbottom, who left £27,000 for the purpose, and includes a large lecture hall, class-rooms, and an observatory. A substantial road leads over the sands to the South Pier, at the mouth of the Tyne. There are several dry docks, and the building and repairing of ships is carried on with activity. The chief manufactures are of glass, earthenware, soda, alum, and ale; and there are iron-foundries, paint and varnish works, rope-walks, and potteries. Coals are brought down the river in keels, and shipped at South Shields, and there are also coal mines in the vicinity. The borough returns one member to Parliament; and the population in 1881 was 56,875. The parish of Jarrow, once celebrated for its monastery, in which the Venerable

Bede was educated, formerly contained, besides South Shields and Westoe, the chapelry of Heworth, the township of Jarrow, and the small townships of Hutton, Hedworth, and Monkton. South Shields was taken from it, and constituted a separate parish in 1845. The bar which formerly obstructed the mouth of the harbour has been removed by dredging, in order to render it, by means of two extensive piers which have been carried a long distance out to sea, a harbour of refuge. The lifeboat was invented at South Shields by a Mr. Greathead, and the first was built there in 1790. Shields is first mentioned as an inhabited place in 1239. Rapidly the twin towns of North and South Shields appear to have risen to sufficient importance to excite the jealousy of the neighbouring port of Newcastle, as in 1257 the burgesses of that town complained that the prior of Tynemouth had built a town called "North Sheeles," where there were not formerly more than three houses, at which town much traffic was carried on; and that the prior and convent of Durham had built on the other bank of the Tyne another town, called "South Sheeles," which was similarly an object of complaint. South Shields is presumed to have been anciently a Roman station, and during the time of the Civil Wars it was an important stronghold. The fort of South Shields occupied the site of the old Roman station.

SHIFT. See **VIOLIN**.

SHI'ITES or **SHIAHS** (Arabic *Shiah*, *shiat*, a sect or faction) is the name of a Mohammedan sect of heretics. It is principally used to designate the sectaries or adherents of Ali Ibn Abi Taleb, who maintained him to be the lawful caliph and imam, and say that supreme authority, both in spiritual and temporal matters belongs to his descendants. The Persians are Shiites, and the Turks Sunnites; hence the schism still subsisting between them, which has been maintained on both sides with ardent zeal and implacable hatred. The chief points wherein they differ may be reduced to three.—1. The Shiites reject Abu Bekr, Omar, and Othman, the first three Caliphs, as usurpers and intruders, whereas the Sunnites respect them as rightful imams. 2. The Shiites prefer Ali to Mohammed, or at least look upon him as his equal in every respect; while the Sunnites admit neither Ali nor even any of the prophets to be equal to Mohammed. 3. The Sunnites receive the *Sunnah*, or body of traditions concerning the prophet, as of canonical authority; the Shiites reject it as apocryphal and unworthy of credit.

SHILLING, now the twentieth part in value of the English pound sterling.

Originally the word shilling (Old English *scilling*, from the Aryan root *skil*, divide) was both a quantity and a weight, very much as the word pound also was. The Old English scilling meant a sum of four silver pence, and later on a sum of five silver pence, for which there was no coin, but at the Norman conquest the Norman shilling of twelve pence (still a quantity and not a coin) replaced it. As we now reckon fees in guineas, though we have long had no such coin as a guinea, so our ancestors reckoned property in shillings, although no such coin existed until centuries later. Domesday Book is computed by these statutory shillings throughout. So also after the Conquest, the Old English scilling weight became definitely the twentieth part of the pound weight; and of this, one example is as good as a hundred. Thus the 50 Henry III. (1266) orders that "if the coin be at 12d. a quarter, the farthing loaf shall weigh six pounds sixteen shilling," that is, 6½ lbs. The penny, the shilling, and the pound have ever since the Conquest borne the same relations to each other, though their actual value has at times varied very greatly. The first great alteration was the levying of a seigniorage for the expense of coining, of 16d. in the pound, so that the pound of silver was actually coined into 236 pence, whereof only 210 were given out to the owner of the silver as equal to

the pound in value. This expedient was so tempting that more and more seignorage was levied, until at last the pound sterling sank in weight to less than a third of the pound troy. Under William the Conqueror the pound troy made 256 pence, under Henry VIII. it made precisely the double, 512 pence.

The first king to coin a shilling was Henry VII., in 1504. This shilling was equal, as usual, to twelve pence (silver), and was a twentieth of a pound (money). In weight it was by no means the twentieth of a pound (troy), which would of course be 288 grains, but was precisely the half of this—namely, 144 grains. The pound troy therefore made 180 l., or 40 s. The fineness of the silver was that known from time immemorial as the "Ancient Right Standard," 11 oz. 2 dwts. of fine silver to 18 dwts. alloy (which is expressed decimally .925 fine). The debasement of the shilling went on. Henry VII. started it at 10 to the pound troy of silver, Henry VIII. got 42 s. 8d. out of the pound troy. Elizabeth got 60 s. where her grandfather got 40 s.; and James Stuart managed to get one or two more. So it went on, until under George III. no less than 66 s. were coined out of a pound troy of silver. Our present shilling is of the standard of George III., 66 of the pound troy = 87.27 grains or 5.65518 grammes of silver, .925 fine, which is the "Ancient Right Standard."

The shilling was the first of our coins to bear a portrait of the king. The very interesting coin of Henry VII. is shown in our Plate Coins (Plate IV.). Up to the nineteenth year of his reign Henry continued to coin the old forms of angel, noble, groat, and penny. In 1504 he began the shilling, and in place of the conventional bust, full face, which had prevailed since the days of Edward I. he placed a profile bust, which had not been seen since the days of Stephen. This bust was an actual portrait of a high degree of excellence, and the effect was so good that it was adopted for the whole of the coinage, and has ever since been adhered to. Another curious shilling is that of Philip and Mary, showing pitifully the poor queen's constant efforts to associate Philip with her in the sovereignty. The queen and her Spanish consort are shown on the obverse of the coin facing each other in profile, as if, in the popular word of the time, they were about to kiss. But the English people were wise to the argument of the shilling. Philip was king of Spain, but with their god will he never was, and never was held to be, king of England, further than as the husband of the English queen.

SHINGLE is a loose accumulation of waterworn pebbles, and in strictly scientific works the term is exclusively applied to a deposit in order to distinguish it from the accumulation of angular fragments, which falls under the denomination of GRAVEL.

SHINGLES (Lat. *crupula*, a girdle), *Zona*, or *Herpes Zoster*, an eruption of the skin characterized by the appearance of a number of spots or blotches, following the course of one or more of the intercostal nerves, and forming a belt half or more around the body. These spots at first appear as it were a little blister, but the fluid in them afterwards becomes thicker, and they finally pass into nasty-looking scabs. The disease is usually preceded by headache, fever, uneasiness upon the side, and is marked sometimes by considerable pain and irritation, the eruption being attended with burning, pricking, tingling sensations, and occasionally by pains of a nerve-like character. It is not infectious, and it usually runs its course in from fourteen to twenty-one days, leaving the patient weak and neuralgic. In slight cases no constitutional treatment is required, and the local treatment may be limited to dressing the eruption with flour of ower, or with two or three layers of cotton wool. A lotion of oxide of zinc and lime water will also be found useful in allaying the attendant pain and irritation. When there is much weakness, stimulants and nourishing food are required, and febrile symptoms call for the use

of aconite or quinine. When convalescence is established, cod-liver oil with tonics should be used to restore the strength of the patient. There is a popular opinion that if the body is fully encircled by the spots of the eruption, the patient must inevitably die of the disease, but this is merely a superstition, and is quite destitute of any foundation in fact.

SHINTO', the Chinese name usually given by foreigners to the ancient indigenous religion of Japan, which the Japanese themselves call *Kami no michi* (the way of the gods). When the Buddhist missionaries arrived in Japan, in the sixth century, they found Shinto spread over all Japan; and after a long Buddhist interval the ancient faith once more became the state religion, in 1868, with the restoration of the authority of the Mikado. Shinto is much mixed in its common worship with forms of Buddhism and Confucianism; but great efforts were made to purify the worship and restore it to its original condition. The pure Shinto worshippers are very few, and are rapidly becoming fewer, and even mixed Shinto (*riyobu shinto*) is fast disappearing before the march of civilization in Japan; for, in fact, Shinto is hardly what we mean by a religion. It has no ethical nor doctrinal code, no worship of images, no priestly power, no hell nor purgatory, indeed no teachings concerning a future state. It has countless gods, and deifies heroes, emperors, and great men without number. Fourteen thousand gods are enumerated, but the Japanese themselves say there are "eight millions," that is, an infinite number. The Mikado himself is a god, and is descended from the mighty sun-goddess Amaterasu, through 122 divine Mikados, his predecessors, and through five generations of terrestrial and seven of celestial gods; and the three divine insignia of power, the mirror, the sword, and the stone, have come down to him from his great ancestress herself, whose gifts they were.

Amaterasu descended to earth (i.e. Japan) because of the turbulence of the earthly gods, deposed the latter, or rather transferred their rule to the invisible world, and set Ninigi her son in their place. Since then Ninigi and his succeeding Mikados have ruled Japan visible, Okuninshi and his succeeding earth-gods invisible. It follows from this that obedience to government is an act of worship. "To compel obedience from human beings and to love them is all a sovereign has to do," says a Shinto sage. Twice a year the emperor celebrates a general purification of his people. He is a god, and his palace is a temple. In the ninth century a Buddhist missionary, Kobo-dai-shi, hit upon the brilliant idea of announcing that the Shinto gods were all emanations or manifestations of Buddha, and the reigning Mikado, charmed with the idea, set up a new "two-fold Shinto" (*riyobu shinto*), which has ever since been the popular form. The Buddhist doctrines, ritual, and priesthood now largely invaded Shinto. Later on, tired of the many puerilities of the two Shintos, the educated adopted the Confucian philosophy instead of any religion at all, and in our own day the English philosophy of Spencer and Mill has ousted Confucianism. The restoration of Shinto as a state religion in 1868 was of course a political move to insure, if so it might be, the absolute obedience of the common people. In a year its regulation was taken from the "department of the celestial and terrestrial gods" to a "religious board," and in 1877 was quietly transferred to the ministry of the interior. The famous old "department" was the most solemn, ancient, and dignified body in the state, and it is difficult to see how the Mikados continue to identify politics with religion when all divine concerns are looked after in one part of the Home Office!

Shinto temples are absolutely bare, unpainted wooden rooms, covered by a thatched roof. There is no altar, idol, or ornament. The only objects visible are a steel mirror, a copy of that given to the first divine Mikado by the sun-goddess (and even this mirror is not exposed in pure Shinto

temples), a *gohei*, a few unlacquered wooden trays with offerings of saké, rice, &c., and some sprays of the evergreen (*Cleyera japonica*). The *gohei* is a slip of unpainted wood with two long pieces of paper, notched alternately on each side, hanging from it. In the pure Shinto temples, which are quite empty, there is a receptacle, also empty, where the spirit-substitute, "god's seed," is believed to dwell. The great symbol of the temple is the *torii*, a Greek letter π made of the trunks of massive trees, placed at the entrance of the temple avenue. The name means "bird's nest," as the birds dedicated to the gods were accustomed to perch on it. The other Shinto emblem is a rope of rice straw, varying from the heavy cable which hangs across a *torii*, to cords no thicker than a finger, hung across house doors.

The gods are supposed to be present at the temples dedicated to them, but the worshippers do not enter the temples. They content themselves with calling the attention of the god by pulling the cord of a metal globe, half bell, half rattle, which hangs at the open entrance. There are specified forms of prayer, but worship generally consists in clapping the hands twice and bowing. For this the worshippers may have travelled over 100 miles, and their simple genuflections ended in a few brief moments, they cast a few copper coins through the open door on to the floor of the temple, and so depart. On festivals, decorated cars with sacred emblems are drawn along in procession, with music and dancing; and sacred (solo) dances are performed, a prominent feature in which is always a maiden bearing a *gohei*. The ceremonies are exactly followed year by year, but the modern Japanese can give no account either of their meaning or their origin. Both appear to be quite lost.

In nearly all Japanese houses there is a "god shelf," and on this shelf is a miniature wooden temple containing the names of the household gods written on slips of paper, tablets to the memory of ancestors, &c. Fresh flowers, and especially the leafy twigs of the *Cleyera japonica*, are offered daily, with the first rice boiled that day, and with water and saké. A lamp is lit before the shrine at night, and the twinkle of these innumerable little lamps is a feature of the evenings in Japan. Ordinary Shinto daily worship needs no priest. It is enough to frame a wish without uttering it. Most people turn to the sun in the early morning, rub the hands slowly together, think a moment, and bow. That is all. There is no dearth of gods to choose from. There are gods of all things; of wisdom and happiness, seedtime and harvest, gate and forecourt, house and family, of all concrete and all abstract things. To one who inquired of a Shinto revivalist why no moral code was taught, the shintoist replied, "In China they truly did invent a moral system, for those wicked men needed it much; but in Japan we naturally practise the way of the gods." It is most difficult for the fairest observer to detect in Shinto any other religious feeling than the extraordinary reverence for the dead which it insists upon. It is no wonder that it perishes fast.

SHIP. This word (with slight modifications) is common to all languages of Teutonic and Scandinavian origin—for example, Norse, *skip*; Danish, *skib*; Swedish, *skipp*; Low Dutch, *schip*; German, *schiff*. For the war-ships of antiquity, see the article **TRIREME**. For the construction and other particulars regarding modern ships, see **SHIPBUILDING**. For the laws relating to ships, see **SHIPS, LAWS RELATING TO**.

In the widest sense "ship" now means any decked vessel for conveyance by water, as distinguished from an undecked boat; but it is more generally confined to the larger sorts of vessels. In a restricted technical sense, it means a vessel with at least three masts, square-rigged; such a vessel is sometimes also distinguished as a *full-rigged ship*. For other rigs see **SAILS AND RIGGING**.

SHIPBUILDING. To a maritime people the importance of the art of shipbuilding needs no demonstration. History supplies numerous examples of the vital necessity both for war and mercantile ships to maintain and promote the welfare of the British nation—the former to protect our shores from invasion and our overseas commerce, the mercantile vessels to bring us our food supplies, and to carry away coal, iron, and the manufactures of our own country.

The earliest ships are of unknown antiquity but the history, paintings, and monuments of the oldest nations supply records of the use of ships as carriers. Romans of vessels, more ancient than authentic history, are from time to time excavated from the river banks and shores of this and other countries. Among the races of mankind in different stages of civilization, examples are still found of the successive steps in the early development of the art, such as the wicker-work boats or "coracles," covered with hides, or bark smeared with mud or pitch, to keep them water-tight; the canoe, carved with the most primitive tools from the trunk of a tree; and small vessels rudely framed and planked with wood. The first vessel of which a description exists is the ark, and from Hebrew history we learn that ships of importance were engaged in the Levant trade long before the Christian era.

Sails, oars, and even paddle wheels appear to have been used by the ancients for propelling their ships. The modern modes of propulsion are described under **STEAM VESSELS**.

In the development of shipbuilding, the most important change was the substitution of non-ferrous wood. Formerly ships were built of wood. Since 1830, however, metal is gradually superseding that material. Excepting small fishing and coasting boats, it is now rare to find a vessel being built of wood.

The fundamental principle of naval architecture, that the weight of a floating body equals the weight of the fluid displaced, is said to have been first enunciated by the Greek philosopher Archimedes in the third century B.C. Until within comparatively recent times modern advance in the science of naval architecture can be said to have been made. Near the end of the eighteenth century the French mathematicians Bouguer and Dupin were the first to investigate the theories of stability. It is only within the last twenty years that these theories have been extended and usefully applied to practice. Among the causes which have been most instrumental in promoting this advance was the introduction into our navy of low-sided vessels with large spread of sails between 1860 and 1870. The capizing of H.M.S. *Captain* in 1870, and the lamentable upsetting of the *Daphne* when launched in 1883, have proved great incentives to inquiry into stability problems, and very recently the extension of exact knowledge in this connection has been accompanied with satisfactory practical results.

The theories of resistance and propulsion were understood but little, if at all, until the present century. The late Professor Rankine and Mr. Froude have done much to elucidate these, although their labours still leave them in the position that it cannot give results without being in most cases supplemented by experiment. See **STEAM VESSELS**.

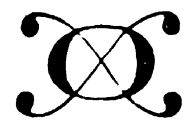
In designing a ship for a specified purpose, the chief considerations are given to the *form*, including the dimensions appropriate to the carrying power and speed, and to the *construction*, which involves the question of strength with due regard to economy of materials.

Form.—As an illustration of the form of a modern iron sailing ship, the reader is referred to Plate I. The body plan shows the vertical transverse sections, numbered in order to agree with the corresponding straight-line sections of the sheer and half-breadth plans. The horizontal water-

lines of the half-breadth are also numbered to correspond to their respective straight water-lines of the sheer and body. In the sheer the profile of the vessel is shown, and the curves A, B, C, D, are longitudinal vertical sections called *bow and buttock lines*. It is the usual custom to place the head or *bow* to the right, and the *stern* to the left side of the sheer drawing, as in Plate I. The body, sheer, and half-breadth plans define on a plane surface the external form in a convenient manner for making the calculations necessary. They are generally drawn to the scale of a quarter of an inch to one foot, but for small vessels the scale is often increased to half an inch or one inch to one foot for convenience. The curves are drawn by means of thin battens of lincwood or pitch pine held in position by lead weights. Thin moulds of hard wood are used for the quick curves.

A block model is made of the longitudinal half of the vessel, to give a complete conception of the form in connection with the sheer draught, and for other purposes referred to hereafter. The model is constructed of layers of yellow pine, the thickness of each layer being equal to the interval between the water lines of the sheer plan. The boundary-lines of the upper and lower edges of each layer correspond to the curved water-lines of the half-breadth plan. Any abruptness or other objectionable feature appearing in the model as prepared from the drawings is at once detected.

considered bad workmanship when occurring in a vessel, unfairness in the submerged part increases the resistance to speed. The process of fairing both model and drawings being complete, corresponding measurements taken at the vertical, horizontal or diagonal sections should agree on the three plans (Plate I). Thus the half-breadth at No. 1 water-line of the body plan, section No. 18, equals the breadth at the same water-line and section in the half-breadth plan. The diagonal lines mentioned above are straight lines in the body plan drawn nearly square to the curved sections. They are set off on the half breadth, and the curves so developed are useful in detecting unfairness not apparent from the water-lines. Bow and buttock lines are also serviceable in fairing the bow and stern. It is customary to draw the bow-half sections on the right side of the middle line of the body and the stern sections on the other side. The fullest transverse section of the body is called the *midship section*, the sign for which is here shown (see diagram, Plate I); it is generally at or near the middle of the length. When consecutive sections have the same form and shape, that portion of the length is termed *straight rabbled body or combdat*. Some shipbuilders number the transverse sections in order from midships forward and aft, but the most general practice is to number them from the after-end, as in Plate I.



It will now be apparent that if any two of the three plans of the sheer draught be given complete, the *third* can be represented. The form of a plane section drawn to cut the vessel in any given direction can be developed from the combined use of the plans. Problems such as the foregoing and the determination of the shape of any part of the surface are designated "laying off."

On the fair model are arranged and drawn the sections, the cages and butts or ends of the plates forming the outside skin of the vessel. Measurements necessary in ordering the materials for construction are then taken from the model, or from the detailed plans prepared as the work progresses.

When the sheer draught and model are completed, the three plans are laid off to full size on the *mould-loft floor*, a large smooth wood floor painted black. By this operation, any slight discrepancy that has escaped detection in fairing the plans will be multiplied according to the scale

used in making the drawings. Hence the "fairing" of the body receives its final touches on the mould-loft floor. In building a ship with iron or steel frames, the next step is to "scribe" or rase in the body sections on a level wood surface placed conveniently near the furnaces where the frames are heated. The latter are bent or *set* to the shape of these sections in order, on rectangular blocks of cast-iron in front of the furnaces.

Mercantile vessels vary considerably in their proportions, according to the nature of the trade they are engaged in. Sea-going sailing ships range from seven to twelve depths, and from four to seven breadths in length, the usual proportions being ten depths and six breadths. Steamers generally are narrower and not so deep as sailing vessels; they are from nine to sixteen depths, and from six to ten breadths in length; the average proportions may be taken at eleven depths and eight breadths. War-ships are generally broader than those of the merchant service, because of the heavy armour and guns they carry high, and the probable damage from shot in action, necessitating proportionately large breadths or *beam* to give stability, which will appear from the sequel.

*For special trades, such as river service where the water is shallow, for example, the depth is as small as practicable, in some instances only one-nineteenth to one-twentieth of the length. And in sea-going vessels the depth is frequently limited by the existence of some bar or reef in or near the entrance to the harbour which the ship has to enter. One of the most important branches of the art of shipbuilding is the determination of the proportions of a vessel which is to perform special service with the maximum of economy.

Calculations.—In connection with designing a vessel the most important calculations are those for the *displacement*, the *weight of the hull and equipment*, the *stability*, and for a steamship the *propelling power* necessary for the speed desired. See STEAM VESSELS.

Displacement calculations are based on the principle stated previously, that the weight of the fluid displaced and of the body displacing it are equal. A cubic foot of salt water weighs 64 lbs. and of fresh water 62.5 lbs. approximately. The volume of the submerged portion of a ship being estimated in cubic feet, it is easy to determine the weight of the displaced water in pounds at the rate of sixty-four or sixty-two and a half per cubic foot of salt or fresh water. The common method of calculating the volume is by the use of "Simpson's rule," which assumes that a ship's curves are all parabolic. In elementary works on naval architecture this rule will be found, but it may be interesting to observe that Simpson was a professor of mathematics at Woolwich last century. Recently displacement and all calculations in which the form of a ship is involved, have been shortened and made easy by means of the planimeter and integrator, instruments invented by Amsler-Laffon. With these the area of any plane figure is quickly determined, by tracing its outline with the pointer of either of these instruments, and then multiplying the numbers read off from the index plate by a constant dependent on the scale of the drawing. In addition to the area, the moment and the moment of inertia of the figure are also given by the integrator.

A simple extension of Simpson's rule, combined with the statical principle of moments, determines the position of the *centre of buoyancy*, which is the point through which the resultant of the total water pressure acts vertically upon the ship. The two evident conditions for a floating body to be at *rest* are: the weights of the displaced water and of the body must be equal, and the lines of action of the resultant pressures of the water and of the weight of the body must coincide. The displacement in tons and the height of the centre of buoyancy in feet being obtained for the several water-lines, the results are set off to appropriate

scales from a base-line on perpendicular ordinates spaced to correspond to the water-lines. The curves drawn through the off-sets are the *scale of displacement* and the *locus of centres of buoyancy* respectively, from which the displacement and the position of the centre of buoyancy can be read off for any draught.

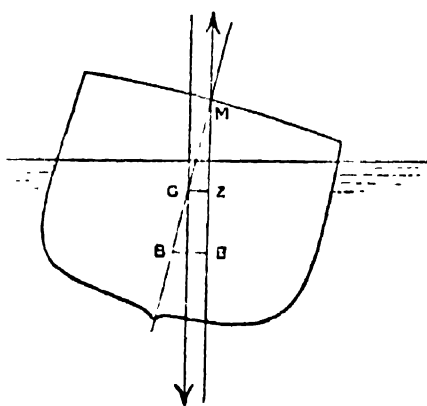
The *weight* of a mercantile iron ship, with the equipment, is from 30 to 35 per cent. of the total weight when fully laden. Steel ships weigh less than iron, as will be seen hereafter. The weight of wood vessels is from 36 to 45 per cent. of the load displacement—hence the introduction of iron for shipbuilding has been attended with considerable advantage in the carrying capabilities. From the nature of the service to be performed, war-ships are generally heavier than mercantile vessels. Iron war-ships of the early types weigh 58 per cent. of the total displacement, while in recent ironclads, without masts and built chiefly of steel, the hulls are only 30 per cent. of the total weight of the ship complete, with armour, guns, &c. See White's "Manual of Naval Architecture."

Estimates of the weight and position of the centre of gravity of hull are laborious and complicated when these have to be made from the drawings alone. In most cases, however, the *actual* weight and position of the centre of gravity of a similar completed vessel are taken as bases for the calculations for a new design. The latter method is obviously more direct and less liable to error than the former.

In connection with transverse stability investigations the *vertical* height of the centre of gravity is required, as will presently appear; but the longitudinal position of the same is also required for determining the *trim* or difference of draught at the bow and at the stern. When the draught of water is the same at both ends the vessel is said to be on an *even keel*.

Stability.—A floating vessel at rest is acted on by two equal and opposite forces—buoyancy and weight. Suppose by the application of an external force that the vessel is held at rest in some angular position, as shown in fig. 1. The centre of buoyancy, which was at *B* when the vessel was upright, has moved to *B'*; the centre of gravity, *G*,

Fig. 1.

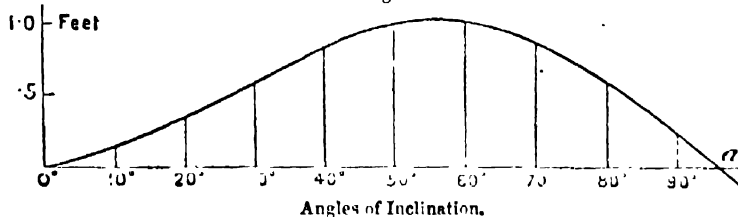


remains fixed unless weights on board have been allowed to shift. A static couple is now acting, as shown, tending to restore the vessel to the upright, and the length, *GZ*, is the arm of that couple. This is a position of *stable* equilibrium, which will always be the case so long as *B'* falls outside *G*. If the vertical through *B'* is on the other

side of *G*, the effect of the couple will be to heel the vessel further away from the upright position, and we then have *unstable* equilibrium. At any given angle of heel the length of *GZ* is a measure of the righting or upsetting force, as the case may be; for the vertical forces, buoyancy and weight, are constant—always assuming that the vessel is held at rest to the required heel. The importance of stability investigations will be obvious when it is remembered that to avoid capsizing *some* righting power is required in any angular position a vessel may be expected to assume under the influence of the wind and waves.

The lengths of *GZ* are usually calculated from the drawings for 5°, 10°, 20°, 30°, and so on up to 90° (which is the *beam end* position) by means of Atwood's formula. This formula appears to have been contributed to the *Transactions of the Royal Society* in 1796, and the principle it asserts is, that the volume of the *newly immersed* part of the vessel, multiplied by the horizontal distance between its centre of buoyancy and the centre of buoyancy of the volume *newly emerged*, is equal to the whole displacement of the vessel multiplied by the horizontal travel of the centre of buoyancy, due to the heeling from a given position. Ansel's integrator has recently been used with advantage in making these calculations. Having obtained the lengths of *GZ* they are set off from a base line on ordinates corresponding to the angular intervals, and the curve passing through the off-sets is called a *curve of stability*. (See fig. 2.)

Fig. 2.



This curve is different for each draught of water taken and for alterations in the height of the centre of gravity—or it depends on the form of the vessel and the manner of loading her. Curves of stability, for *constant* angles of heel and *variable* draughts, have recently been introduced as *cross curves of stability*. They are very useful, in connection with mercantile vessels especially, where the light draught and the load draught are very different. The ordinary curve of stability (fig. 2) can be readily obtained from the cross curves for the same vessel, by measuring the lengths of *GZ* corresponding to each angle of heel, at the draught for which the ordinary curve is required.

Near the end of a voyage the coals and stores which were on board a steamer when she started are practically consumed, so that the centre of gravity is usually higher and the draught of water less than when she set out. These changes decrease the righting power as a rule, and it is customary to estimate the stability when the vessel is in such a condition.

A large number of iron and steel steamers, and a few sailing ships, are fitted with inner or double bottoms for carrying water-ballast. (See Plate II.) These tanks are easily filled through sea-cocks, provided for the purpose under water, and are emptied when necessary by the steam-pumps. When filled the additional weight of water has the same effect as ballast in lowering the centre of gravity and consequent increase in righting power. A convenient arrangement is thus available to those in charge for correcting loss of stability in the light condition, or in other conditions in which the margin of stability has been shown by the designer to be small. Water-ballast is also useful in cases where steamers are required to go from port to port in a light condition, not only to give stability,

but to increase the efficiency of the screw-propeller by extra immersion. The practice of shipping and discharging stone or rubble ballast in sailing ships when a cargo is not forthcoming is more expensive than the use of water-ballast is. When a vessel approaches the condition of no stability she rolls slowly through large angles of inclination under the action of small external forces. This can be modified by filling one or more of the compartments, into which the ballast tanks are divided by transverse water-tight partitions or bulkheads. Another advantage with inner bottoms is the increase in the safety of a vessel when the outer bottom has been broken through grounding, of which several instances are recorded.

Permanent ballast of pig-iron or lead, secured inside, is sometimes used in narrow deep vessels to obtain the necessary stability, and lead keels are fitted to sailing yachts with the same object.

If a vessel be heeled from the upright position to a small angle of inclination, the vertical line through the centre of buoyancy, when so heeled, will intersect the vertical through the centre of buoyancy for the upright position. The point of intersection is the *metacentre*—*M* in fig. 1, if the angle of heel be supposed small. The intersections of similar vertical lines for all consecutive angles of heel is termed the *locus of metacentres*. Referring again to fig. 1, if *M* is above *G*, there is a righting couple, and if below, a couple tending to upset the vessel. The position of the metacentre is thus said to be the limit of the height of the centre of gravity for stable or unstable equilibrium. When *M* and *G* coincide we have the condition of *neutral equilibrium* or *neutrality*.

The distance between the metacentre and the centre of gravity is called the *metacentric height* (*MG*, fig. 1). The greater this height the greater will be the righting power, and *conversely*. No definite metacentric height can be set down as necessary for all vessels, independently of other considerations, for the volume and form of that part of the vessel above water when upright has most important influence on the extent or range and area of the curve of stability. Fully laden steamers, whose sides are high above the water, are known to have ample range of stability with 6 inches only of metacentric height. On the other hand, with low sides above water, a metacentric height of from 2 to 3 feet is necessary to prevent capsizing.

The height of metacentre above centre of buoyancy is determined by dividing the moment of inertia of the plane of flotation about a longitudinal axis through its centre, by the displacement. Hence the breadth or beam of a vessel has a more direct effect on this height than any other of the principal dimensions. Narrow vessels have low

Am. m , for example, of great breadth and small depth has a metacentric height of 14 feet. With a large metacentric height a vessel among waves rolls quickly, and is said to be *stiff* or *snappy*, so is liable to be seriously strained and otherwise damaged by the waves breaking over her, and sometimes disaster happens from this cause. With a moderate metacentric height she rolls easily among waves, with comfort to her crew, to those on board and with advantage to the strength of her hull and fittings. The designer therefore has to arrange between too much stiffness and too little stability for safety.

In heeling a vessel from one position to another the *work* done is called the *dynamic stability*. This is represented by the *area* of the ordinary curve of stability (fig. 2) comprised between the original and final positions taken.

The following simple method for ascertaining experimentally the metacentric height when the vessel is afloat is now adopted by many shipbuilders:—A known quantity of weights is moved horizontally across the deck—the distance between the centres of gravity of the weights in the first and second positions being measured. This has the

effect of heeling the vessel, and the angle of inclination due to the transfer of weights is observed by means of a plummet. The draught of water and the displacement of the vessel are also noted. Then the metacentric height is determined from the simple equation—the weights moved by the distance they have been shifted equals the displacement by the horizontal travel of the centre of gravity of the vessel. From this equation the unknown travel of the centre of gravity can be found, and when multiplied by the cotangent of the angle of heel, the result is the metacentric height. As a direct easy check on the calculations made from drawings this experiment is most valuable.

Recently an ingenious mechanical method has been invented by Mr. Heck for determining the curve of stability. A sectional model of the vessel connected to a framework balance is immersed to the required depth in water in such a manner that it can be fixed at regular angles of inclination. The upward pressure of the water on the model is counteracted (so as to keep the balance level) by adding weights on the balance. The total weight necessary for this varies with the angle of inclination, and then from the principle of moments the position of the vertical through the centre of buoyancy is found, from which the curve of stability is soon arrived at. (For details of the invention see the *Transactions of the Institution of Naval Architects* for 1886.)

A degree of similarity exists between the oscillations of a ship in still water and the swinging of a pendulum, but erroneous conclusions are frequently drawn from the assumption that they are in all respects alike. With large metacentric heights ships roll quickly, as before stated, but the greater the length of a pendulum the longer will be its period of oscillation. The monitor, previously quoted, with a metacentric height of 14 feet, will roll twenty times from one side to the other in a minute; while some vessels having 3 feet of metacentric height roll only seven to eight times per minute. The quickest rollers among waves are also the deepest rollers. For detailed investigations on rolling, the reader is referred to the works of Froude and

Rankine. The expression $T = \pi \sqrt{\frac{k^2}{gm}}$ gives approximately the time or period of oscillation of a ship in still water; *T* is the period in seconds for a single roll, *k* is the radius of gyration in feet, *g* is the force of gravity = 32½ feet per second, and *m* is the metacentric height in feet. Actual observation confirms the deduction from this formula, that the period for a large angle of inclination (say 20 degrees) is the same as that for a smaller inclination—the equation being independent of the angle. We also infer from the formula that the period *T* can be *lengthened* by increasing *k*, which is accomplished by placing heavy weights out near the sides of the vessel, or *winging* them, as it is called, or by decreasing *m*—that is, by raising the weights. Evidently *T* is *shortened* by adopting converse means.

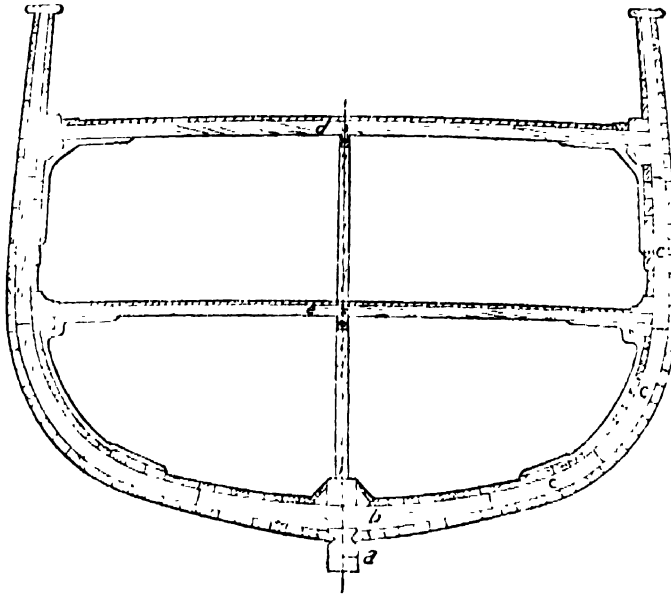
The late Mr. Froude showed theoretically that, when the period of a vessel is the same as the period of the waves among which she is rolling broadside on, the amplitude of each successive roll is increased by the impulse of the waves until capsizing is inevitable. To avoid this it is desirable that a vessel should have a longer period than the waves she meets; and bilge keels are sometimes fitted to lengthen the period and reduce rolling. The three following effects developed by a ship rolling also operate to bring her to a state of rest, namely, *wave making*, *keel resistances*, and *surface friction*, and the first has by far the greatest influence of the three, the last-named having the least.

When a vessel is heeled to, say, 10 degrees, there is generally a difference in the volume of the part of the hull newly immersed and of the part emerged. For an instant

this inequality causes the displacement and weight of the vessel to be unequal, and the unbalanced force produces small vertical motions, which are termed *dipping oscillations*. Pegtop shaped midship sections, such as the "Symonite" form, introduced into the navy by Captain Symonds about fifty years ago, are more liable to this kind of uneasy motion than the ordinary form shown in Plates I. and II.

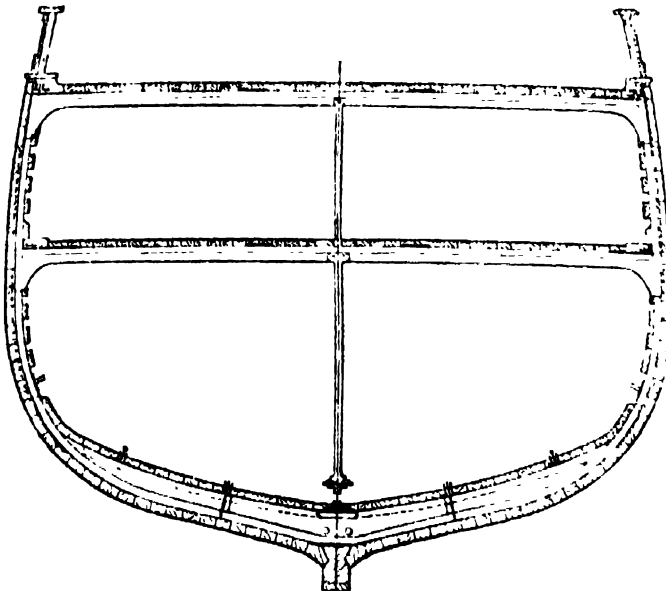
Longitudinal stability is measured by the resistance offered to turning round a transverse axis, and it is cal-

Fig. 3.



culated on the same principles as the transverse stability is. Up and down motions of the bow are called *pitching*, and those of the stern *scending*. The height of the longitudinal metacentre, which directly affects these motions, is

Fig. 4.



always far more than the height of the transverse metacentre, in some cases exceeding the length of the vessel. Change of trim, due to shifting weights forward or aft, is estimated from the height of the longitudinal metacentre—

just as moving weights across the ship involves in the result the height of the transverse metacentre. Vessels with full or U-shaped sections at the bow and stern do not sink so deeply into waves as those with V-shaped sections, and are therefore said to be more lively. The full sections at the ends, however, are not conducive to high speed. To counteract the tendency of sharp ends to cut into waves heavy weights are stowed amidships.

Steering.—The usual method of steering or directing the course of a vessel is by means of the rudder, hung to the stern of a vessel in such a manner as to admit of its being turned round a vertical axis. The largest angle with the fore-and-aft or keel line that a rudder makes in practice is about 40 degrees, and its turning effect is nearly in proportion to the sine of the angle of inclination of the rudder. The area of the rudder ordinarily is from one-thirtieth to one-fortieth of the area of the middle line immersed plane of the vessel. In vessels of shallow draught, or where rapid manœuvring is necessary, the rudder area is considerably increased. Steam or hydraulic power is frequently applied to turn the rudder in steamers of great speed. Twin screws in conjunction with the rudder afford means for altering the course of a vessel quickly in special cases.

Structure.—Fig. 3. (woodcut) shows a midship section of a modern vessel built of wood. The principal parts are the *keel*, *a*, upon which are the *floor* *is*, *b*, the timbers of the frame—*stretches*, *c*, forming continuations of the floor. At the fore and after ends of the keel, the stem and stern-post are vertical extensions of the keel. The transverse frames are connected above by the *beams*, *d*, of the upper deck, and *e* of the lower deck. The outside planking and the inside planking or *ceiling* are fitted longitudinally, and are fastened to the timbers of the frame with bolts of copper, yellow (Muntz) metal, or iron, with a large proportion of iron nails or round head-wood fastenings. On the beams the decks are laid and fastened, with the planks running longitudinally. The joints of the outside planking and of the decks are caulked or made water tight by driving into them oakum or tarred hemp, afterwards coating the joints with pitch. Thin sheets of copper or Muntz metal are nailed to the keel and outside planking below water, to protect the wood from borers and to prevent fouling. The gradual exfoliation of the sheathing effectually attains these ends. In first-class wood ships the frame timbers and the principal portions of the planking are of British oak, a strong and comparatively durable material. Pine wood and spruce are largely employed in shipbuilding, but these are not so strong or lasting as oak; teak ranks highest. To brace the frame timbers together diagonal iron straps or *riders* are fitted on the outside surface of the timbers. In wood ships of the navy it was the practice to fit them on the inside of the timbers.

The chief disadvantages of wood ships are their weight as compared with that of iron ships, their want of durability (from dry rot and other species of decay, especially in parts not easily accessible), and lastly, the impracticability of building them sufficiently strong when of large dimensions and for great speed.

Composite Ships.—The system of building ships with iron framing planked with wood (see fig. 4), grew out of the introduction of iron for shipbuilding. The wood planks are fastened to the frames with yellow metal screw bolts. Diagonal iron straps are riveted to the side framing, and the bottom is sheathed with Muntz metal or copper, as with wood ships. Vessels built on the composite system are not so heavy as those built of wood, and are consequently capable of carrying more cargo. There is no difficulty with them in obtaining fine ends for speed with sufficient local strength. Both wood and composite have the advantage over iron ships, in the protection the metal sheathing affords against fouling. On the other hand, the wasting away of the non framing and plates of composite ships through the inevitable galvanic action between the yellow metal fastenings and the iron of the hull, below water especially, is found to be serious after a few years from the date of build. As dry rot has been one of the principal causes of the gradual extinction of wood shipbuilding, so has the wasting of the non in composite ships proved to be an effectual check on the continuance of the composite system. A few yachts are, however, still built on the method. Before the opening of the Suez Canal, several clipper composite sailing ships were employed in the China tea trade, and they performed the work with great success.

Iron ships of war that are required to remain three or four years on foreign stations where there are no dry docks, are sometimes sheathed under water with wood planks and then with Muntz metal, the object being to prevent fouling.

Iron Ships.—The general arrangement of the parts of their hulls is illustrated in Plates I. and II. The *keel*, *a* (Plate I., *midship section*), is of forged flat iron in long lengths; the *frames*, *b*, and *reverse frames*, *c*, are of angle iron, forming transverse ribs spaced about 2 feet apart; the *floors*, *d*, are plates fastened to the frames and reverse frames across the bottom of the vessel; the *locksons*, *e*, are girders running longitudinally on top of the floors. Side and deck *stringers*, *f*, are fore and aft girders connected to the sides; and the transverse *beams*, *g*, are formed of bulb plates and angle irons connected to alternate frames. The frames are covered outside with overlapping strakes or widths of plates from 12 to 14 feet long. To connect the lengths of plates in the same strake at their *batts* or ends, inside straps are fitted over them between the frames. All the iron plate *h* is bolted to each other by *i* and rivets, which are hammered up while red hot in holes punched or drilled in the plates or buns to receive them. The joints of the plates are caulked water-tight by closing the edges with flat-pointed chisels.

Vessels of large size (see Plate II.) require iron decks riveted to the beams to give the strength necessary. Wood decks are generally laid on top of the non, as shown.

Steel Ships.—Within the last twelve years the improvements in the manufacture of mild steel for shipbuilding have been so decided, and this material, from its superior strength and ductility, is now gradually superseding iron, just as rendered wood. Of the gross tonnage of the iron and steel ships built during the year 1885, about 36 per cent. was of steel. The average tensile strength of good ship non is 20 tons per square inch, and of mild steel suitable for shipbuilding 30 tons. In view of the superiority of steel over iron the plates and angles are usually from 10 to 20 per cent. less in thickness than iron plates and angles are required to be, so that the weight of the hull of a steel ship is proportionately less than that of an iron ship of the same dimensions. Again, steel plates endure considerable indentations without fracture (much more than iron can), a quality which renders steel safer than iron ships when the bottom is damaged through grounding.

Both iron and steel ships' bottoms corrode and become foul from the growth on them of seaweed and shell-fish, unless they are kept well coated with paint of some kind. This necessitates placing them in dry docks once a year at least, when their bottoms are cleaned and recoated. The paint compositions in common use are generally more successful in preventing corrosion than fouling. The surfaces of the iron and steel, both inside and outside, require to be kept free from rust and well painted; if these precautions are neglected, the wasting of the thickness of the material soon assumes a serious aspect in the cost of repairs.

Launching.—On the completion of the hull, preparations are made for moving the vessel into the water. A fore-and-aft *cradle* of wood is built at about one-sixth the breadth of the vessel on each side of the keel, so as to entirely support her when all blocks and shores, put under the bottom during construction, have been removed. The cradle is seated on the planks or *ground ways*, which have their upper surfaces faired to a declivity of about seven-eighths of an inch to one foot, and thickly coated with grease to reduce friction. When all restraints are removed, the vessel, supported by the cradle on either side, moves lengthwise into the water on the ground ways under the influence of her own weight, and when she is water-borne, the cradle comes floating up from below.

Strength.—The requirements of each successive age have influenced the development of the art of shipbuilding, and the practical experience of many generations is embodied in the methods of construction of the present time. In 1838 the steamer *Great Western* took fifteen days to cross the Atlantic, while now the voyage is performed in a little over six days. This affords some idea of the advance made in the art of shipbuilding during the last fifty years. And it needs no argument to prove the importance of the strength of the large steamers which successfully perform this most trying Atlantic voyage at high speeds and through terrific storms.

Estimates of longitudinal strength are based on the assumption that a vessel is similar to a hollow girder or beam with variable loading and support. In still water the middle length of a ship has usually more of buoyancy than weight, while at the ends the weight exceeds the buoyancy. Among waves, if we suppose a ship at rest for an instant across the crest of one whose length is the same as her own, the ends of the ship are nearly out of the water, and the condition is much more trying than in still water. The maximum bending moment is then on the midship section, and in large Atlantic steamers the tensile stress at the upper deck is estimated to be about 6 tons per square inch. On the bottom there will be compressive stresses of less intensity. The tendency of these stresses is to bend the hull upwards, or to *hog*, in the condition stated. A different set of stresses results from a ship being supported by the hollow of a wave, for the ends are now deeply submerged, while the buoyancy of the midship part is less than it was in the former case. The general effect in this case is a tendency of the hull to bend down in the middle of her length, or to *sag*. These stresses, however, are rarely of the same magnitude as those experienced on the wave crest, and are not often investigated. Hogging and sagging recur alternately in a vessel passing across a series of waves. The stresses due to the pitching and rolling of a vessel have not yet been quantitatively determined, and it is usual to insure that there is a large factor of safety in connection with the approximate stresses estimated on the assumption that the vessel is at rest in a given condition.

Transverse stresses are not, in ordinary cases, so great as the longitudinal stresses, and they are met, for the most part, by the arrangements giving the longitudinal strength. Water-tight athwartship bulkheads contribute to the transverse strength, and indirectly to the strength in the direction

of the length of the ship. But their most important function is to give safety when one compartment of the vessel is flooded by accident. It is important to have the watertight transverse bulkheads so distributed, that when any one compartment is filled with water the buoyancy of the remainder is sufficient to preserve the vessel from foundering.

Freeboard is the height of the upper deck above water at the middle of the length of the vessel. This subject has recently been much discussed, more especially since the agitation caused by Mr. Plimsoll in 1873-74, against the dangerous practice of overloading cargo ships. The load-line committee appointed by the government in 1884, to inquire into the freeboard questions, issued tables in the following year for the determination of freeboards for cargo ships of all sizes, excepting special types. The basis of the tables is that when a vessel without deck erections has the freeboard tabulated, the volume of hull above the water bears a certain ratio to the total volume. The reserve buoyancy above water ranges from 22 per cent. of the whole volume of small vessels to 35 per cent. in the case of very large vessels. The freeboard of ships having light superstructures all the length of the upper deck, such as spar and awning decked steamers, is determined from considerations of strength of hull—the reserve buoyancy being much in excess of the upper limit quoted above. The freeboard question, as considered by the committee, is essentially one affecting cargo ships, for those employed in passenger service, with high speeds, have much more freeboard than the tables provide for.

Increase of Shipping.—The mercantile navy of England first became considerable in the reign of Elizabeth, and gradually increased under her successors, James I. and Charles I. At the Restoration the British shipping cleared

outwards amounted to 95,266 tons; but such was the increase of navigation during the reigns of Charles II. and James II., that at the Revolution the British ships cleared outwards amounted to 190,533 tons. The war terminated by the treaty of Ryswick in 1697 checked this progress. But commerce and navigation have steadily advanced, with the exception of two short periods during the war of 1739 and the American War, from the beginning of the 18th century down to the present day. See NAVY.

The first really authentic account of the magnitude of the commercial navy of England was obtained in 1701-2 from returns to circular letters of the commissioners of customs issued in January of that year. From these it appears that there belonged, at the period in question, to all the ports of England and Wales, 3281 vessels, measuring (or rather estimated to measure) 261,222 tons, and carrying 27,196 men. In 1887 the number for the United Kingdom amounted to 21,000 vessels, of 7,500,000 tons, with 200,000 men.

The sea-going merchant navies of the world, reckoning vessels of 100 tons and upwards, consist of about 60,000 vessels, of 19,000,000 tons. Of these 50,000 are sailing vessels and 10,000 steamers. Of the sailing ships, two-fifths belong to the British Empire; while in steam vessels the superiority is still more striking, the British proportion being nearly 65 per cent. of the whole. In sailing vessels Norway ranks next after our own country, followed by the United States, Italy, Germany, France, Spain, Greece, Holland, and Sweden. With regard to steamers, France occupies the second place, followed by the United States, Germany, Spain, Russia, Sweden, Norway, Holland, Italy, and Austria. The following table shows the rapid increase of British shipping during the present century, especially since 1850:—

AN ACCOUNT OF THE TONNAGE OF BRITISH AND FOREIGN VESSELS (SAILING AND STEAM) ENTERED AND CLEARED WITH CARGOES AND IN BALLAST AT PORTS IN THE UNITED KINGDOM

Years.	Entered Inwards.			Cleared Outwards.			Total Tonnage Entered Inwards and Outwards
	British.	Foreign.	Total.	British.	Foreign.	Total.	
	Tonnage.	Tonnage.	Tonnage.	Tonnage.	Tonnage.	Tonnage.	Tonnage.
1815	1,993,150	656,271	2,649,421	2,105,676	671,690	2,777,366	5,426,787
1825	2,143,317	959,312	3,102,629	1,793,842	906,066	2,699,908	5,802,537
1835	2,442,734	886,990	3,329,724	2,419,941	905,270	3,325,211	6,654,935
1845	4,310,639	1,735,079	6,045,718	4,235,451	1,796,136	6,031,587	12,077,305
1850	4,709,199	2,400,277	7,109,476	4,742,315	2,662,243	7,404,558	14,514,034
1855	5,270,792	3,080,447	8,351,239	5,648,910	3,889,491	9,538,401	18,489,640
1860	6,889,009	5,283,776	12,172,785	7,025,914	5,490,403	12,516,317	24,689,102
1865	9,623,432	4,694,454	14,317,886	9,735,523	4,843,683	14,579,206	28,897,092
1870	12,380,390	5,732,974	18,113,364	12,691,790	5,836,028	18,527,818	36,641,182
1875	16,190,991	7,502,172	23,693,163	15,763,753	7,829,922	23,593,675	47,286,838
1880	20,490,512	8,583,043	29,073,555	20,858,472	8,894,036	29,752,508	58,826,063
1885	22,960,461	8,881,056	31,841,517	23,408,591	9,010,631	32,419,222	64,260,739

Modern Shipbuilding.—Of late years the development in size, speed, and passenger accommodation of steamers has been very considerable. The introduction of iron, and the recent use of steel for shipbuilding, together with a more intelligent distribution of materials in the structure, have had much to do with the improvements made in response to the requirements of the times. Not the least important factor in this connection is the modern marine engine.

The present tonnage of the shipping of this country is quite, if not more than, equal to the demands of trade, and the shipbuilding capabilities of Great Britain may be said to be capable of maintaining the supply after allowing for inevitable losses, deterioration, and the natural increase of trade. In 1840 the total tonnage on the British Register was about 3,250,000, and in 1886 this had grown to 9,323,615, inclusive of British colonies.

The largest vessel yet afloat is the well-known *Great Eastern*, built of iron in 1858, from the designs of Brunel

and Scott Russell. Her length is 680 feet, and she is constructed on the longitudinal system of framing introduced by Scott Russell. Within the last few years the length of this vessel has been gradually approached, but not equalled, the next largest steamer being the *City of Rome*—516 feet long—built in 1881. In 1860, however, if we omit the *Great Eastern*—the longest steamer was only 300 feet. Six steamers built since 1881 are over 500 feet, and about ninety between 400 and 500 feet in length. Or if we take tonnage as a measure of size, there are now twenty-nine steamers of over 5000 tons each, and seventy-seven between 4000 and 5000 tons. (See *Lloyd's Universal Register*.) Recently a few sailing ships have been built of over 2000 tons, the length of each being about 300 feet. These large vessels are, of course, all built either of iron or steel. The Cunard steamers *Umbría* and *Etruria*, built in 1884, are 501 feet in length, 57 broad, and 38 deep. Their load displacement is 11,970 tons at 26 feet draught of water, and the speed they maintain at sea is

19½ knots per hour. They each carry nearly 750 first-class passengers. The *Vitruvia* has made the fastest passage across the Atlantic yet recorded (six days five hours thirty-one minutes). Another sample of a first-class passenger steel steamer is the *Austral*, illustrated in Plate II. She was built in 1881 for the Australian trade, is 456 feet in length, her load displacement is 9500 tons at a draught of water of 25 feet, and her speed at sea is 17 knots.

The tonnage of steamers on the British Register is about 4,000,000, and of sailing ships 3,300,000, so that the steamers exceed the sailing ships by 700,000 tons. The tonnage of British ships built of wood is about a fifth of the total on the British Register.

The vast fleet of boats engaged in the passenger service between Great Britain and other countries, and the economically efficient cargo vessels of the present time, are triumphs of nava architecture of which the shipbuilders are justly proud.

For detailed information on shipbuilding, ancient and modern, we refer the reader to such works as, Furbush's "Iron Shipbuilding," Scott Russell's "Modern System of Naval Architecture," "Shipbuilding, Theoretical and Practical," by Watt, Rankin, Napier, and Barnes (MacKenzie, Glasgow), Rees's "Shipbuilding in Iron and Steel," "On Iron-clad Ships," and "Stability of Ships," Whit's "Manual of Naval Architecture," and Threlkeld's works on "Naval Architecture," and "Shipbuilding in Iron and Steel."

SHIP-MONEY (Old English *Skippend*) was first levied on the owners of the ships of Great Britain and other seaports, in 1643. In 1648 levied the cost of raising and repairing the great fleet of England. All such sailing vessels were liable to it, whether destined by the owners for foreign service or ordered by Maria II. in 1670, "to be employed and to be to the Great Council of the nation for their authorization. Nevertheless, Charles II. took it that the levitation of his attorney-general (Nelson) was up a new own royal authority to the city of London and other ports to supply a number of ships and with this view to press their inhabitants. London and some of the seaports vainly remonstrated. Perceiving the success of the plan, Charles II. took it that he would extend it to inland towns (1647), and much money was thus received. The levy was increased by the statute in each county. John Hampden refused to pay the tax and was accordingly proceeded against by law. Oliver St. John defended him on four principal points: (1) that parliament alone could levy taxes by Parliament; (2) that the alleged process applied to seaports only; (3) that the fact of the royal power to levy a tax on the sea was in violation of the royal prerogative; and (4) that the statute law from Maria II. in 1670 to the Parliament of 1678 was against the levy. Nevertheless, such was the severity of the penalty that the rate of the tax was made payable, they were obliged to pay it. By a subsequent act, after a trial lasting three years and a half, the levy was highly unpopular. Charles II. took it that it benefited more the porters and the owners of the ships. Ship-money was abolished in 1689 by the Parliament of 1689.

SHIPPING ARTICLES.—The articles of agreement between the captain of a vessel and the crew on board, in respect to the amount of wages, length of time for which they are shipped, &c.

SHIPS, LAWS RELATING TO. The law of England relating to merchant ships and seamen is partly founded on principles of maritime law common to the whole civilized world, and partly on Acts of Parliament, of which the Merchant Shipping Acts of 1854 and 1876 are simplifications and consolidations.

English.—Every British ship, with the following exceptions: (1) ships not exceeding 15 tons burden, employed

solely in navigation on the rivers or coasts of the United Kingdom, or of some British possession within which the managing owners of such ships are resident; and (2) ships not exceeding 30 tons burden, and not having a whole or fixed deck, and employed solely in fishing or trading coastwise on the shores of Newfoundland or parts adjacent thereto, or in the Gulf of St. Lawrence, or on such portions of the coasts of Canada, Nova Scotia, or New Brunswick as lie bordering on such gulf—must be provided, before being employed in navigation, with a certificate by the Board of Trade containing particulars of her official number, her managing or responsible owners, her commander, her measurement capacity, and a general description of her build and character. This document is called the Register, and its possession is necessary for a vessel to claim the character of a British ship and the protection and advantages of British law. The master must at all times be ready to produce it, and any one withholding it from him is liable to heavy penalties. A ship unprovided with it, and flying the British flag, is liable to forfeiture. As the Register is taken as conclusive evidence of ownership, any change in this respect must be notified to the proper officer, generally an officer of customs, at the port where the ship was registered, who endorses the alteration upon the Register and gives notice to the chief registrar of shipping. The sale of a ship, or share in a ship, is by bill of sale, and is completed by the endorsement upon it of a certificate of registry of the transfer.

Official Number.—Every registered ship has a number assigned to her by the registrar of shipping, which, as long as she is afloat, belongs to her, so that whatever changes of name or ownership she may undergo she can always be identified.

Ownership.—A British ship may be owned by British subjects, whether by birth or naturalized, who are resident, or who are members of business firms carrying on business in, or by companies or corporations established under British laws in her Majesty's dominions. The ownership may be held by one person, as is frequently the case with sailing ships, but more rarely with steamers; but every ship is considered as divided into sixty-four equal shares, though no more than thirty-two names can appear as owners upon the register at one time. No notice is taken of copartnerships or trusts, but any number of individuals, not exceeding five, may be registered as joint owners, such joint owners, as regards the above rule, being taken as one ownership. The ownership of the great lines of steamers is often held by companies with limited liability, but that of ordinary trading vessels is most usually treated as if each individual vessel were a separate venture, the shareholders appointing a managing owner, whose payment is sometimes by a commission on earnings, and sometimes by a fixed sum. The managing owner is sometimes called a ship's husband, but frequently the ship's husband is some one with technical knowledge appointed by the managing owners to assist their masters or captains in cases of difficulty in port. Where no agreement has been come to as to the management, the majority of the shareholders are authorized to employ the ship on "any probable design," but they are only entitled to do so upon giving security to the minority in a sum equal in value to the united shares of the latter. If they are part-owners and not partners, as is much more commonly the case, the law is that they are severally liable, each upon his own contract. Between partners the relation of principal and agent is implied; between part-owners it must be proved. The duties of a managing owner are thus described by Mr. Bell (1 Comm. 410, fourth edition):—(1) To see to the proper outfit to render the vessel seaworthy; (2) to provide a proper master, mate, and crew; (3) to provide stores suitable to the voyage; (4) to see to the regularity of all clearances from the custom-house, and the regularity of the

registry; (5) to settle the contract and provide for the payment of the furnishings requisite in the performance of those duties; (6) to enter into charter-parties, or engage the vessel for general freight, and to settle freight and adjust averages with merchants; (7) to preserve necessary documents and to keep regular books of the ship.

If a shareholder holds a majority in value of shares he may appoint himself managing owner, but any agreement to appoint as master in consideration of a purchase of shares is invalid, though for obvious reasons it is common for a master to hold a small stake in the vessel he commands. In the absence of any express agreement or admitted practice, with the full knowledge and consent of the shareholders, the managing owner is not entitled to any commission, or if in course of his own business he supplies any goods or necessities to the ship, he is not entitled to charge more than cost price, and any profit may be recovered by his co-shareholders.

The ownership of a vessel may pass by capture—in which case it is necessary that a sentence of condemnation should be obtained in a court of the nation by whom the capture has been made—by purchase, by the death or bankruptcy of the owners, or by failure to meet loans raised upon its security. Managing owners have power to sell without reference to mortgages on shareholders' shares.

Master.—The master, commonly called the captain, is the commander of the ship, and has the sole management of it. He is responsible for any injury done to the ship or cargo in consequence of his negligence or incompetence. Provision is made by the Merchant Shipping Act for giving certificates of fitness to those who are found, by testimonials and personal examination, to be qualified by previous good conduct, and by ability, skill, and knowledge, to undertake such a command. The possession of such a certificate by any one going to sea from this country in the capacity of master or mate is compulsory. There are certificates of competency for master, and first or second or only mate of a foreign-going ship, and for master and mate of a home-trade passenger ship. The certificate for the higher office qualifies for the lower, and that for the foreign-going ship qualifies for the home-trade passenger ship, but the reverse does not hold good. As regards the general business of a ship, whenever it is possible to communicate with the owners, it is advisable in all important business to do so or to ascertain that the master is possessed of their authority. Subject to this precaution the master can enter into binding engagements for the employment of his ship, but if such an engagement does not express the authority of the owners, and is made in the name of the master only, it will not support a direct action upon it against the owners. Still, if the contract is duly made, and under such circumstances as afford either direct proof of authority or evidence from which such authority may be inferred, the owners may be made responsible either by a special action on the case or by a suit in equity. The master can also render the owners liable for repairs done and provisions and other things furnished for his ship's use, or for the money which he has expended for such purposes. In this case also the remedy of the creditor is against the master, unless by express contract the owners alone are rendered liable, and also against the owners. A party who has done the repairs upon a ship has a right to retain the possession of it until his demands are paid; but if he gives up possession, he is on the same footing as other creditors. When, however, the ship is abroad, and the necessary expenses cannot otherwise be defrayed, the master has power to hypothecate the ship and freight as security for debts contracted on behalf of the ship. The contract of hypothecation is called a contract of bottomry, by which the ship upon its arrival in port is answerable for the money advanced, with such interest as may have been agreed on. [See BOTTOMRY.] By such hypothecation the creditor

acquires a claim on the ship. If the necessary amount of money cannot be raised by hypothecating the ship and freight, the master may also sell part of the cargo or pledge it.

The master is held responsible for the safe navigation of his ship at all times, and it is his duty to see that she is in all respects well found and fit for an intended voyage and provided with all necessary documents, and that she is properly stowed and not too deeply laden. In fact, as he has complete control over all connected with the vessel, so he is held to be responsible for her safety and proper condition and management in every respect. In steamers some soreness exists among the engineers as to the master's control over the engine room, but subject to the limitation imposed by the laws of self-preservation, the master's authority must be held to be supreme even there. In port a master must be extremely careful how he exercises his authority, and should at the earliest possible opportunity in any difficulty place himself in the hands of the proper authorities. During the voyage he is bound to take every possible care of the cargo, and to do all things necessary for its preservation; and he and the owners will be answerable for all damage which might have been avoided by the exercise of skill, attention, and forethought.

The 17 & 18 Vict. c. 104, contains the regulations as to the lading of merchant seamen and many provisions for their protection. The use of authorized shipping masters, introduced by 8 & 9 Vict. c. 110, is continued in the later statute.

The master has authority over the passengers as well as over the crew. If a passenger thwart the master in the exercise of his authority, or otherwise misbehave himself, he may be put under restraint or imprisoned. If a passenger feels himself aggrieved by the manner in which he has been treated, he may bring an action against the master. To regulate the conveyance of passengers of the poorer or emigrant class, and to ascertain and enforce the precise duties which are binding on owners and masters who engage in this description of trade, the legislature has passed successively several general statutes, the chief of which are the Passengers Acts, 1860 and 1863. But these Acts apply, with some few exceptions, only to voyages from the United Kingdom to any place out of Europe, and not being within the Mediterranean Sea, and do not extend to "passenger ships," *i.e.*, ships carrying more than thirty passengers, or a greater number of passengers than the proportion of one statute adult to every 50 tons of her registered tonnage, if a sailing vessel, or one to every 25 tons of her registered tonnage, if a steamer. Most of the other cases of passenger traffic, no small proportion of the whole, remain still as they were at common law. But the rights of action to which any one is entitled at common law are not taken away or abridged by the statute. These Acts embodied and amended all the previous regulations, and appointed emigration officers for the inspection of passenger ships, who were to see that there was fit accommodation, sufficiency of food, water, &c. By an Act which came into operation in 1873, the Board of Trade is empowered to discharge the duties which had previously been performed by the Emigration Commissioners, and passenger steamers are annually surveyed. If a passenger fails to pay his fare, the master or owners lay a lien on his luggage for the amount. If during the voyage a ship is so damaged as to be unable to proceed without repairs, the master may detain the cargo, if not of a perishable character, till the repairs are made. If the cargo is of a perishable kind, he ought to tranship or sell it, as may appear the more beneficial course. He may also, in all cases where the circumstances require it, exercise a discretion as to transhipping the cargo; as, for instance, when the ship is wrecked or in imminent danger.

Measurement.—The capacity given in the Register de-

notes the cubical capacity—*net register* denoting the space within which cargo may be placed, and *gross register* the cubical space, including all parts of the ship cabins, crew-space, and engine-rooms. The *dead weight* capacity is generally based on the quantity of coals which a vessel can actually carry.

Carriage of Goods.—The arrangements under which goods are conveyed in vessels are generally embodied in a document called the charter-party, or a ship is advertised as ready to receive general cargo as it may be presented. The word charter-party is derived from two Latin words, *charta partita*, divided charter, because the duplicates of the agreement were formerly written on one piece of paper or parchment, and afterwards divided by cutting through some word or figure so as to enable each party to identify the agreement produced by the other. The charter-party is generally an agreement by which the owners of a vessel place her at the disposal of the merchant to take on board and carry to some specified port or ports a cargo of some specified article, which the latter on his part binds himself to provide; or an agreement by which the vessel is let to a person, generally called a loading broker, to take on board such cargo as he may choose, otherwise general cargo; or an agreement to let the ship for a specified time, either with or without limits as to ports and cargoes, in which case it is called a time charter. The term *freight* is sometimes applied to the cargo, but more often describes the payment stipulated for. *Demurrage* is the amount agreed to be paid as penalty for detaining the vessel in port longer than the time stipulated for. Cargo is also frequently obtained by a *charter-party*, in large or small parcels, as they may come forward. A ship is then said to be "loading in the berth," and the terms "Bill of Lading," which is really the master's receipt for the goods, but which, even when there is a charter-party, as the "last document signed," always contains an undertaking to deliver the goods in a proper condition, the chief terms of the agreement, and generally an endorsement of the time consumed in loading, and the cash advanced to the master.

The owner of the ship has always a lien on the goods in the ship, when the freight is to be paid before or on delivery, or even, as Lord Tenterden decided (2 Barn. and Ald. 693), where there is "nothing to show that the delivery of the goods was to precede the payment of that lien." All difficulties may be avoided by inserting a clause in the charter-party which shall state whether it is meant that the owner should have a lien upon the cargo for his freight and expenses. The owner does not lose his right of lien by depositing the cargo in a public warehouse, provided he gives notice that it is to be detained until his claim for freight is satisfied. But notice of legal action by the consignees and the deposit of security will release the goods. Upon payment of freight and the production of bills of lading, the cargo must be delivered to the parties entitled to receive it. If goods are sold by the custom-house officers before the freight is paid, the master is entitled to receive the first proceeds of the sale in discharge of the freight.

By the term "sailing in ballast" is meant that a ship is making a voyage without cargo, and if she carries anything it is just be only sufficient to make her float safely and properly, and must be without saleable value, though vessels, especially those laden with timber, frequently take a small quantity of iron or other heavy goods to add to their safety, which is called "the ballasting."

Hypothecation of a cargo, like hypothecation of a ship, is "a pledge without immediate change of possession." The party to whom the goods are hypothecated immediately acquires a right to have possession of them if the money advanced is not paid at the time agreed on. This power of the lender under circumstances of urgent necessity to sell the hypothecated goods must be exercised with great

circumspection; and the exercise of it can only be justified when it is consistent with what would have been the conduct of a discreet and able man under the circumstances.

Certain circumstances operate as an excuse to the master and owners for non-fulfilment of their contract for the safe carriage of goods in the ship; such as lightning, tempest, and other casualties. But if a ship is placed in a dangerous situation by the carelessness or unskilfulness of the master, and is consequently lost, there is no legal excuse. By the 26 Geo. III. c. 86, owners are relieved from losses proceeding from fire, and also from the robbery, theft, and embezzlement of "gold, silver, diamonds, watches, jewels, or precious stones," unless at the time of shipping them their quality and value are made known in writing to the master or owners. The 17 & 18 Vict. c. 104 applies to registered ships, and may be considered as containing almost all the law upon the subject. By this Act the responsibility is limited to the value of the ship and freight. In cases where ships receive injury from collision with each other, if the collision has occurred without any fault on either side, as, for instance, from a tempest, each party must bear the injury which he has sustained. If it happens wholly from the fault of one ship only, her owners are liable, as far as the value of the ship, to which their liability is limited, for the amount of injury caused by their own conduct. If the collision has been caused by the faults of both ships, each party must sustain his own loss.

Salvage is that reasonable compensation which persons are entitled to receive who save a ship or cargo from loss or peril by sea, which may be called civil salvage; or recover them after capture, which may be called hostile salvage. There is no fixed amount of salvage. What is reasonable can only be determined by a reference to the circumstances.

In cases where the parties cannot agree as to the amount, the salvors may retain the property until compensation is made; or they may bring an action, or commence a suit in the Admiralty Court, against the proprietors for the amount. The Court of Admiralty has jurisdiction in those cases only where the salvage has been effected at sea, or within high and low water mark. Several statutes have been passed providing for what is to be done in case of ships in distress, and for the purpose of regulating and facilitating the adjustment of demands of salvage, but they are consolidated by the Act of 1854.

Seamen's Wages.—A seaman may recover his wages by suit, either before a magistrate in the common law courts, or in the Admiralty courts. If in the former, his only remedy is against his debtor personally; if in the latter, he may proceed also against the ship itself. The remedy of the master against the owners was confined to an action against them personally in the ordinary law courts, but he may now proceed in the Court of Admiralty. Seamen may bring a suit, in which they all may join, in that court; and they can either arrest the ship or proceed personally against the owners or the master. In the case of British seamen, if the contract be made by deed containing terms and conditions different from those resulting in contemplation of law from an ordinary service, the Court of Admiralty ceases to have jurisdiction.

Maritime Insurance.—A maritime insurance is a contract by which one party, who is called the insurer, in consideration of a premium, undertakes to make good to another, who is called the insured or assured, the loss or damage which may befall his ship or goods on their passage from one place to another. The instrument containing such a contract is called a *Policy*. A great proportion of the business connected with the shipping insurance of this country is transacted at Lloyd's underwriters' establishment in the Royal Exchange, London. Insurers are commonly called underwriters, from the circumstance of their writing at the foot of the policy their names and the por-

tion they are severally willing to take of the amount for which the merchant desires to insure.

The form of policy usually adopted is of ancient origin, and rather obscure in its phraseology, but most of its terms have acquired a certain meaning from judicial interpretation, and it is therefore found convenient to retain them. The ordinary form is found in treatises on the law of shipping.

The policy will be vitiated by misrepresentation or concealment, on the part of the assured, of any fact material to a correct estimate of the risk; and the underwriter will be discharged from liability if the ship do not proceed on the same voyage with that described, or if there be any unnecessary stopping or deviation. According to law a person must have a *bona fide* interest in the object insured, but policies marked P.P.I. (meaning "policy proof of interest") are common, and frequently a great deal of speculative insuring goes on when a steamer is overdue. See ADJUSTMENT; AVERAGE; BARRATRY.

It was formerly the practice to encourage English ownership by legal enactments, but there are now no privileges whatever enjoyed by British vessels that are not equally enjoyed by the vessels of all nations.

Ship Investment.—Regarded as an investment the chief risk lies in the exclusion of a sailing vessel from all suitable trades by the introduction of steamers, which may mean a total loss of value; but there is always a fair chance that a well-built ship may find some trade open to her, and as the expenses are less than in a steamer, and the deterioration very little, she can better afford to wait for a market to open to her. In the case of steamers the profits earned by a well-managed boat (a custom has grown up of distinguishing steamers from sailing ships by calling them boats) are often very large for the first few years, but against this must be put their certain rapid deterioration in saleable value, the certainty that boilers will need renewing after a few years, at a time probably when the best trades are closed to the vessel by loss of the highest class, the great expense of working a steamer in bad times, and the continued deterioration while laid up (the life of a steamer, as a profit earning-machine, averaging perhaps little over twenty years), and the rapidity with which improvements render the finest boats of the day obsolete. In fact, a very small portion of the large dividends sometimes paid at first should be treated as income. To other risks must be added those from panic and ignorant legislation.

Seamen in the Royal Navy, and Impressment.—It is stated by Blackstone, on the authority of Foster, "that the practice of impressing and granting power to the Admiralty for that purpose is of very ancient date, and hath been uniformly continued by a series of precedents to the present time, whence he concludes it to be a part of the common law." As impressment is effected by the king's commission, Barrington, in his "Observations on Ancient Statutes," p. 331, fifth edition, shows that the king used once to

be power of impressing men for the land service also, and even for his own private service, as in the case of goldsmiths. The legality of impressment is fully established, though the practice cannot be defended even on the ground of the safety of the state, until it has been shown that seamen for the royal navy cannot be procured by other means. The general rule is, that all seamen are liable to impressment. There are several legal decisions as to the question who are seamen and who may be privileged.

Volunteer seamen are induced to enter the royal navy by higher wages; and every foreign seaman who shall have served in a ship of war, a merchant ship, or privateer for two years during a war, is thereby naturalized. The 17 & 18 Viet. c. 104 enacts that guardians of the poor may apprentice to the British merchant sea-service boys whose parents are chargeable to parishes, &c., or maintained by them, or who shall beg for alms therein, provided

the boys are twelve years of age and the execution of the indenture of apprenticeship is attested by two justices of the peace.

SHIP'S PAPERS are the documents required for the manifestation of the property of ship and cargo. They are of two sorts, viz.—(1) those required by the law of a country, as the certificate of registry, license, charter-party, bills of lading, bills of health, &c. required by the law of England to be on board British ships; (2) those required by the law of nations to be on board neutral ships, to vindicate their title to that character.

SHIP-WORM. See TEREDO.

SHIRAZ, a city of Persia, 215 miles south-east of Ispahan, in a beautiful and fertile valley, surrounded by mountains, 1500 feet above the sea, formerly the flourishing capital of Farsistan, the residence of the caliphs, and the seat of the highest culture in Asia under the Mongols; it is now almost a ruin, in consequence of earthquakes in 1824 and 1853. It used to be celebrated for its manufactures of cotton, silk, wool, leather, fire-arms, and otto of roses, and for its gardens of roses and pomegranates. A red wine, produced in the neighbourhood, is considered the best in the East; and the tobacco of Shiraz is highly prized. It was the centre of Persian poetry and literature, and it was here that the poets Hafiz and Saadi were born and died. The population is about 30,000.

SHIRÉ, a river of South-eastern Africa, rises from the great Lake Nyassa, and after a southerly course of 250 miles, through a country of great fertility, bounding in sugar and cotton, joins the Zambesi. It varies in breadth from 80 to 150 yards, and its current flows at the rate of 3 miles an hour. Much of its course was explored by Dr. Livingstone.

SHIRE MOOT or **SHIRE MOOT** (*Sheriff's Court*) the ancient English county parliament. See the articles *COUNTY COURT* and *HUNDRED MOOT*.

SHIRES (from the Saxon *sciran*, to divide, whence also comes our word *share*), the name of the districts into which the whole of Great Britain and Ireland is divided. The word *shire* is in most cases equivalent to *county*, a name often substituted for it in Great Britain, and always in Ireland.

The origin of this distribution of the country was the natural division of the land into the separate parishes of the English clergies at the English conquest, which followed the tribal divisions, thus Kent, Sussex, Essex, Norfolk, Suffolk, Middlesex, and Surrey were ancient Lincolnshire, under the name of Lindsey, was a distinct state, and Worcestershire (*Hancast*) was the fief of the Bishop of Worcester. Another division was formed subsequently by making large divisions either for the sake of more easy management when the population of the particular district had increased, or for the sake of giving territory to an earl. Yorkshire was part of the kingdom of Deira, and Derbyshire of Mercia. On the other hand, some shires have merged in others. Winchester-shire is a part of Gloucestershire; Hallamshire (Sheffield), of Yorkshire; and in the Act for abolishing the palatine jurisdiction of the Bishop of Durham (6 & 7 Will. IV. c. 19, s. 1), no less than five shires are mentioned—viz. Cravenshire, Bedlingtonshire, Northamptonshire, and Islandshire, which had long ceased to possess of record they ever had, separate jurisdictions. This confusion of origin, partly due to small ancient kingdoms or *stock* kingdoms, and partly to the convenient subvisions of large ancient kingdoms, accounts for the curious diversity in size and arrangement of our counties. The present division, even in its main form, certainly was not complete until the time of Edgar; and Lancashire we know positively was not an independent county until after the Norman conquest. Yet the principle of division into shires was very early recognized, and is spoken of in the laws of King of

cations may be applied to the head, while in extreme cases, where there has been great hæmorrhage, transfusion may be practised. In both forms of shock it must be noted that the patient requires support, and rest and nourishment are valuable and most important adjuncts to medical treatment.

SHODDY, a worsted yarn produced from old woollen rags, tailors' clippings, or old stockings, which are torn up, fibre by fibre, in a machine technically called a "devil." The material is then spun into yarn, with a little fresh wool added thereto, and made into druggets, padding, and other articles of an inferior quality. In the United States shoddy has become a manufacture of considerable importance, and the article is also produced on an extensive scale in Germany. The chief manufacture in Great Britain is at Dewsbury and Batley, in Yorkshire. The old woollen rags—the last organic remains of coats and trousers—used to be employed for various tiffing purposes; but they have now become the elements out of which new garments will spring. Dewsbury and Batley draw to themselves woollen rags from all parts of Europe; coarse, fine, little worn, much worn, white, coloured, clean, dirty—all are welcome; they may be so good as to command £50 per ton, or so bad as to be worth less than that number of shillings. They are devilled or torn to tatters by the sharp spikes of rapidly revolving machines. The number of teeth varies from 1000 to 1500 on each cylinder, according to the coarseness of the material upon which they have to act. These cylinders make about 600 revolutions per minute, and it will be evident that the work of disintegration must be very effectually performed by their swift action. The women while sorting the rags, and the men while feeding the devils with rags, muffle their mouths to ward off the choking effects of the dust. Shoddy now forms nearly one-fifth in weight of the woollen and worsted manufacture of the West Riding. Mixed with wool, it is largely used in the manufacture of cheap broadcloths, finer cloths for ladies' capes and mantles, pilots, winceys, friezes, petershams, pea-jackets, and blankets. A considerable quantity is used in the form of flocks for beds. Felted cloth is extensively manufactured with it, and used for table covers, carpets, druggets, and horse-cloths. Shoddy, indeed, is now indispensable in the woollen trade, and although the manufacture has given rise to a term of reproach very frequently (and often very justly) applied, it is really a striking illustration of the economy which science introduces into industrial pursuits—that which was formerly considered as entirely devoid of either use or beauty being again converted to purposes of utility.

Scientific industry, not content with this striking development of one industry from the waste of another, has also busied itself with finding uses for the refuse of this secondary manufacture. The seams of rags are put to rot, and are used for manure on arable land. The hop grounds of Kent are said to be generally treated in this way. Still more curious, a valuable chemical agent which is used in dyeing—prussiate of potash—is also obtained from the rags. Even the dirt and dust emitted in the process of preparing the rags are capable of being employed as a manure. Shoddy dust is also collected in separate colours and used for the decoration of paper hangings. In fact, not one of its products is wasted. (The word *shoddy* is the modernization of the Old English *scodan*, "to put.")

SHOE-BILL (*Balaniceps rex*) is a species of bird belonging to the family of Storks (Ciconiidae), of which, together with the **UMBER** (Scops), it forms a sub-family, Scopine. The shoe-bill is a very rare bird, being scantily distributed along the waters of the Upper Nile. It is a large, powerful bird, measuring about 4½ feet in length. The head is large, and bears a broad, somewhat depressed bill, the upper mandible being spoon-shaped and terminated by a strong hook. The legs are very long and

slender, and the naked reticulated portion extends for a considerable distance above the tarsal joints. Very little is known of its habits.

SHOES, in the general sense of leather foot-gear, are common to all civilized nations; and it would seem that their necessity grows with the advance in culture and bodily refinement. Thus, though the Greeks often went barefoot, the Romans practically never did, save from reasons of poverty; and the Scottish and Irish peasantry of to-day wear shoes, though up to the last generation the children and young persons generally went barefoot, save on Sundays and holidays. In the article SANDALS some of the beautiful foot gear of the Greeks are shown, but save Diana, who usually wears pliant hunting-boots, Greek statues are either naked altogether or wear sandals. Roman boots are more numerous. There was the *calceus*, a closed high shoe resembling our lady's boot, which was a necessary accompaniment of the toga; and this, when made of black leather and decorated with an ivory crescent and other ornaments, was the

and part of the official costume of a senator, while in made in scarlet leather and with a high sole like a columnus, it was the *mulleus* of the nobility. The *caligæ* was a military boot with a short top turned over at the upper edge, like the Spanish boots of the middle ages. The Emperor Cæsar derived his nickname of Cæsar from wearing these boots.

There are countless customs and superstitions about shoes. It has been told from time immemorial most unluckily to put a shoe on the wrong foot, and Butler in his usual witty way has can't lit up an old tale of Phay about the Emperor Augustus—

"Augustus having to go to night
Put on his left shoe before his right;
Had like to have been so, that day
By soldiers mistaking for pay."

Then the customs of shoe-loosing and shoe-throwing are exceedingly ancient. As a mark of respect for a superior, loosing the shoe is universal with Oriental nations. (We ourselves, when we scrape the feet of lower dignities, casting off our own army shoe by the way, throw it of the foot.) When the widow whose husband's surviving brother has failed to do his duty by her and may be wished to demand him, she had to pull off his shoe in the presence of the elders; and otherwise a slave from their xxv. 9; and when Bez took over his house from the one who was nominal head to Ruth's family agreed to the purchase by taking off his shoe (Ruth iv. 7). These shoe ceremonies, even when not essential to the legality of acts dealing with property, were held to be a symbol of stepping of possession. Thus we have the striking phrase—"Over the shoe I shall take possession of Edom." This sense of completion of contract and of taking possession, as symbolized by taking off a shoe and throwing it, may perhaps account for the very common and very ancient custom of throwing old shoes for luck, especially at weddings. Thus Heywood (1546) —

"Now, for good lucke, cast an olde shooe after me!"

And Beaumont and Fletcher in the "Honest Man's Fortune" (1613)—

"Captain, your shoes are old, pray put 'em off,
And let one thing 'em after us."

And Ben Jonson in the "Masque of the Gypsies" (1610)—

"Hurle after an old shoe
I'll be merry while it doe."

Besides the taking off of a shoe symbolizing the ancient law of exchange, and thus representing marriage as in some sense a purchase and transfer of part of the family, the throwing of the shoe, still more vigorously carried out in

Turkey than among ourselves (for there the bridegroom is vigorously pelted), is undoubtedly a survival of the simulated indignation of the bride's relatives when their maiden is carried off by force, equally simulated on the part of the bridegroom. The original necessity for the employment of actual force was that in no other way but by capture could a man in a savage state acquire a right to the exclusive possession of a woman. If she were the captive of his bow and spear she was his private property, and he could legally defy his fellows to claim her.

SHOFAR or **SHOPHAR**, an ancient Hebrew instrument of music, shofar being generally translated by trumpet in our English Bible. The actual shofar was a simple ram's horn, curved naturally, and is to this day blown on Jewish New Year's Day in all synagogues, as Moses commanded (Num. xxix. 1). In this service, before each sounding of the shofar, passages from the Scriptures are read recording its triumphs of old, for the shofar was essentially a national instrument, as dear to the Israelite as the harp to the Irish and Welsh, or the bagpipe to the Scotch. Further, it was so intimately connected with religious services as to have acquired a sacred character, and the trumpeter was a personage of considerable esteem, selected for his office on many other accounts than mere musical skill. His shofar represented to a large extent the symbol of the army or congregation in the same way as the banner or standard of later nations came to do. Nevertheless the size of a ram's horn naturally limits the tone which can be blown with it to a sound possessing very little grandeur or fullness, at least it seems so when sounded before our accustomed to the splendid trumpets of modern times. It is a little trying to one's gravity to hear the Jewish reader solemnly intone Exodus xix. 16, and the celebration so solemnly waiting in the recesses of that splendid description. It reads all possible effect of the imagination to magnify the seven sounds of the shofar, with which the roading of Joshua vi. 4, is now compared, that mighty blast before which the walls of Jericho fell as before artillery. It is, of course, possible that the shofar of antiquity was a much finer instrument than that we now possess, that the true tradition has been lost, like the Hebrew pronunciation, which is no longer known. But against this we have the firm knowledge that ram's horns are much as they used to be, and that the size of a tube must have governed the sound produced from it then as it does now. The natural conclusion is that the combined forces of poetical, of ritual and above all of religious enthusiasm united to swell the tones of the shofar until in the splendid language of Oriental hyperbole it was raised up to blow the mighty blasts which ring through the pages of the Bible.

Other important passages where the shofar is mentioned are Judges vi. 27, vi. 16, 1 Sam. xiii. 3, Ps. xlviii. 5; Jer. xli. 3, xlv. 6, Joel ii. 1.

SHOLA is the Indian name for the white pith-like substance obtained from the stem of *Lechenanthe opuntia*, a species of plant. On account of its extreme lightness it is used in India for making hats, swimming jackets, &c. &c. The plant grows in marshy places and affords a great height.

SHOOTING STARS. See **AEROLITES**.

SHORE, JANE, the mistress of Edward IV., was the wife of a goldsmith in London. She is said to have been born in 1460, and to have died in 1524. She was accused after Edward's death of having conspired with the queen to shroud the Protector's arm (Richard duke of Gloucester, afterwards Richard III.) by sorcery. At the trial when this astounding accusation was made, Lord Hastings, who like all the rest knew that this infamously concocted story Richard from birth, quietly said, "If they be guilty of these crimes, my lord, they deserve severe

punishment." This was what Richard wanted. He turned fiercely on Hastings and taunted him with his "ifs and ands," and crying out, "You are the chief abettor of that witch Shore, and are yourself a traitor," gave a signal to a previously summoned guard of soldiers, who hurried Hastings from the presence and beheaded him. In pursuance of Richard's plan, which was to crush the late king's personal adherents while preserving the ascendancy of the house of York, Jane Shore was arrested, her goods seized and sold, and herself tried for witchcraft before the council. Since absolutely no proof of anything of the kind was forthcoming, she was tried in the ecclesiastical courts for adultery with the late king and with Lord Hastings, and condemned to do penance (1483). She was brutally treated; dressed only in a white sheet, she was driven through the streets candle in hand, the stones cutting her bare feet, frozen in the bitter cold, and the citizens, who looked on pitifully, much as they had grumbled at her in her days of luxury and wastefulness, were prevented from giving her bread. The legend goes that after a long exposure she fell exhausted, and died in the roadside ditch without the city gates at Bishopsgate, in a place called after her Shoreditch. This, however, is untrue. There is proof positive that she was living in 1509, and also reason to believe that she was married again to some one enamoured of her beauty and wit, and that she died in great poverty after new reverses, in 1524. The penance is known to have begun in St. Paul's, but it is quite possible she may have been driven to Shoreditch and fainted there. It is very rare that a traditional name of this kind is wholly without reason.

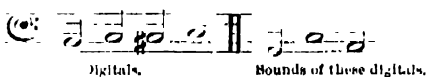
SHOREA is a small genus of the order DIERPACARPEA, containing a few species of large resinous trees from tropical Asia. The genus is found as far south as the equator; and *Shorea robusta*, the best known and most useful species, as far north as 30° N. lat., in many parts forming the forests which skirt the south-western base of the Himalaya Mountains. *Shorea robusta* is the Saul tree of the North-western Provinces of Hindustan, where it is much used for house timbers, gun carriages, &c. The wood is of a light brown colour, close-grained, strong, and durable. It is much stronger and heavier than Indian teak. It is a magnificent tree, frequently attaining a height of upwards of 100 feet. An oil is obtained from the seeds.

SHOREHAM or **NEW SHOREHAM**, a seaport of England, in the county of Sussex, 6 miles W. from Brighton, and 56½ from London by the South Coast Railway, is situated in a level tract at the mouth of the Adur. It was an important harbour in the Norman times, but was gradually choked up by shingle. In 1816 its port was improved by cutting an artificial channel through the shingle embankment and the erection of substantial piers. A handsome suspension bridge was also erected over the Adur in 1833, at the expense of the Duke of Norfolk. Shoreham is the harbour for Brighton, and has also a considerable trade of its own, being a warehousing port for all descriptions of imported merchandise. The articles chiefly imported are coals, timber, spirits, grain, and provisions; the exports are chiefly timber and wool. The chief place of shipment is at Kingston-by-Lea, which is at the entrance of the harbour, and connected with the railway, but is nearly a mile east of the town. It has consequently grown into quite a busy village. The town is irregularly built, and the houses are for the most part old, but many sanitary and other improvements have been made. The principal occupation of the inhabitants is shipbuilding, and there is a considerable oyster fishery. The church is very ancient, and contains Norman, Transition, and Early English portions. It was restored in a very elaborate manner, and at great cost, in 1870. The town contains a large and well-conducted grammar-school. Old Shoreham church, a mile north, is a venerable struc-

ture, and almost wholly of Norman work. From Shoreham Charles II. made his escape to Fécamp, 15th October, 1651. The population of the parish in 1881 was 3572. The parliamentary borough, which was much more extensive than the parish, ceased to have a separate representation under the Redistribution of Seats Act of 1885.

SHORT BILLS are bills of exchange, whether freshly drawn or older bills nearing maturity, which have only ten days or less to run; and the rate of exchange for such bills is called *short exchange*. (The latter term is, however, extended to bills of twenty or even thirty days to run.)

SHORT OCTAVE, an arrangement in old G organs to avoid the great expense of the large pipes of the lowest octave, often costing almost as much as all the rest of the stop together. The organ, therefore, only possessed the GG and AA pipes below C, and the GG pipe was put upon one digital, added for that purpose below the C digital on the keyboard, while the AA pipe was put upon the C \sharp digital and the C \sharp omitted. The arrangement, therefore, appeared on the keyboard as if BB were the lowest note of the organ, and sounded musically thus—



SHORT PARLIAMENT, THE, derived its nickname from its contrast with its successor, the famous Long Parliament. It sat only from 13th April to 5th May, 1649, for, as it refused to grant supplies or to entertain the king's project of coercing Scotland, it was roughly dissolved after three weeks' session by the angry Charles.

SHORT SCORE. See **SCORE**.

SHORTHAND. "Coal, heat, gas, electricity, and shorthand, are powers which have transformed the face of the world," observed the *Times* newspaper lately, when reporting the proceedings of the British Association for the Advancement of Science. The force of steam, the heating and illuminating properties of coal, and the transmissibility of the electric fluid are discoveries, but shorthand is an art and an invention. The discovery of the latent powers of nature can be utilized for the general benefit of mankind in a much shorter time than an invention. In the one case (to take, as another example, the chemical action of light in photography), a discovery can be made available to any extent by an outlay of capital for the necessary apparatus, and a moderate amount of experience in manipulation; but in the other case the principles of the invention must be learned, and the practice of the art must be acquired, by every person who would enjoy its advantages. In the one case, whatever is necessary is done by a few persons for the whole community; but in the other, each person must learn and labour for himself. Hence steam, gas, iron, the electric telegraph, photography, and other discoveries, are fulfilling their benevolent mission in all the great centres of civilization, and are being gradually extended all over the country; while shorthand serves, at present, but few uses beyond those of public reporting. Yet when employed even to this limited extent, it has contributed in no mean degree to "transform the face of the world." When, for all ordinary purposes, it takes the place of longhand, it will save four-fifths of the time now spent in writing.

One cause which has prevented the general adoption of shorthand writing is, that a diversity of systems has hitherto prevailed, all based on the inadequate twenty-six letter alphabet of the English language, with the addition of three signs for *th*, *sh*, and *ch*. But the number of distinct sounds or letters that require signs, in order to represent the English language as spoken, including the monosyllabic diphthongs, is forty-one.

Before entering upon an exposition of Mr. Isaac Pitman's system of Phonetic Shorthand, or "Phonography," which consists of a series of shorthand signs to represent the sounds uttered in speech, and abbreviatory rules for reducing the labour of writing to a minimum, it may be interesting to the reader if we quote a few sentences from a sketch of the history of shorthand given in Mr. Pitman's "Manual of Phonography," this sketch being abridged from his "History of Shorthand," which contains an account of every known system, with its alphabet and principal features.

History of Shorthand.—There are three principal epochs in the improvement and dissemination of the art of shorthand in modern times, ending respectively at the publication of the matured systems of Mason (1682), of Taylor (1786), and of the first edition of "Phonography" (1837); and each may be assigned to some specific cause or peculiar feature of the time. The shorthand of the Romans, as practised by Tiro (the freedman of Cicero), Etruscus, and others, was an abbreviated longhand, both as to the forms of the letters and the orthography.

In the sixteenth and seventeenth centuries the principles of the Reformation were extensively promulgated in this country from the pulpit. A desire to preserve for future private reading the discourses of the principal preachers of that day, led to the cultivation of the newly invented art of shorthand writing. Teachers and systems increased rapidly; and by a comparison of one mode with another, and by experimenting with various series of alphabetical signs, Mason at length produced a system far superior to any that had preceded it. The progress of the art from the publication, in 1588, of Brail's system of military characters for words (or rather, from the publication of the first shorthand alphabet by John Willis, in 1602), to the appearance of Mason's system in 1682, may therefore be considered as resulting from the dawn of religious freedom. Mason's system was published by Thomas Gunney in 1751, and it is used by members of his family, as reporters to the government, to the present time.

No other marked advance was made till the middle of the next century. In 1780 Mr. Perry, then proprietor of the *Morning Chronicle*, organized a corps of reporters. From that time stenography was studied for professional purposes, and though there are some reporters on treadle papers who even yet use condensed longhand, they generally practise the equally simple and far more expeditious system of shorthand. The publication of the parliamentary debates caused a demand for reporters, and for a system equal to their wants. Mason's, adopted by Gunney, was found insufficient. Its lengthy outlines could not be traced fast enough to enable the reporter to keep pace with the flow of eloquence that he often had to record, and the numerous arbitrary signs and contractions of words were too cumbersome for the memory. Byrom's system (privately taught by himself for several years) was made public in 1797, soon after his death. It was much practised in private circles, but was not brief enough for the reporter. Mayow's appeared in 1780, and Taylor's in 1786. These two valuable systems, with many others far inferior, were the fruits of this increased demand for the means of reporting the proceedings of the legislature; and their appearance marks the close of the second epoch, and the dawn of political freedom.

The practice of shorthand writing having been found so favourable to the development of the mental powers of those who used it (as shown, first, in reporting the sermons of the reformers, and then in taking down the discussions of our legislative assemblies), and the experience of above 200 years having proved the utility of the art; and, by the establishment of cheap schools, the ability to read and write having been acquired by nearly all who were able to afford the expense of learning these arts through the medium

of the old alphabet, a somewhat extensive desire was shown, chiefly by young persons, to add to their other means of acquiring knowledge the use of shorthand writing. Treatises on the art had hitherto been sold at high prices, seldom at less than half a guinea, and were thus beyond the reach of many who were desirous of learning. To meet this want, William Harding, a bookseller in Paternoster Row, published, in 1823, a neat edition of Taylor's system, with some slight improvements, at the reduced price of 3s. 6d. The book sold extensively, and in a few years other booksellers supplied, at a much cheaper rate, not only Taylor, but also Byrom and Mayer. The first publication of Taylor's shorthand was by O. B. L. An attempt to improve upon Taylor's system, by marking the long and short sounds of the vowels, with the intention of issuing a cheap edition for general use in National and British schools, led Mr. Pitman to the invention of "phonography." This occurred in 1837. Phonography is, however, so different in all its details from Taylor's system, that its origin could never be discovered from the work itself. Founded as it is on the "alphabet of nature," and already extensively practised throughout Great Britain and the United States of America, its publication may be called the third epoch in the development of the art of shorthand. The immediate cause of the present extended practice of this kind of writing, was the diffusion of knowledge among the middle classes of society. It has yet to be extended to the lowest classes, and this will be the mission of phonography connected with the printing press.

Phonology (Gr. *phoné*, voice), the things relating to the voice, the science which treats of the different organs of the human voice and their modifications. The style of *phonology* in accordance with this science is named *Phonetic*; the common style is called *Rhetorical*, because it is formed from an alphabet derived from that which was used by the Romans.

Phonography (Gr. *phoné*, voice, and *graphé*, writing), the art of representing spoken sounds by written signs; also the style of writing in accordance with this art.

Phonograph (Gr. *phonos*, letter, a written letter or mark, and *graphein*, to contain sound or production of sound, as, *phonograph*).

Logograph (Gr. *logos*, word), a word-letter; a phonogram that represents a word; represents a word; as *l*, which represents *l*.

Graphophon, a letter-word; a word represented by a logogram, as *l* represented by *l*.

Phonogram, a combination of shorthand letters representing a phrase or sentence.


Phonography (according to the Study of Phonography).—The art of phonography may be easily acquired. Experience has shown that its principles are mastered by most learners in a very short space of time, and that an hour's daily practice in reading and writing, continued for about a month, will generally insure tolerable facility in using it. The student is particularly cautioned against attempting to write with rapidity at the outset. When his hand has become accustomed to trace the simple geometrical forms of the phonographic character with correctness and elegance, he will not mindably be writing them quickly; but if he let his anxiety to write fast overcome his resolution to write well, he will not only be longer in attaining real swiftness, but will always have to lament the illegibility of his writing.

Phonography is at all times best written on ruled paper, but plain paper may be used, as in the specimens given in Plate II. The learner should always write upon paper ruled with single lines, and he may use either a quill or a steel pen, or a pencil. A pencil is recommended for exercises and a pen for ordinary writing and reporting. As, however, the reporter is sometimes so situated that he cannot use a pen, he should accustom himself, at times, to

report with a pencil. The pen or pencil should be held as for longhand writing, and the elbow be turned out so that the letter *b* (see Plate I.) can be struck with ease.

Alphabet of Nature.—Phonography is based upon an analysis of the English spoken language. Its consonants and vowels are arranged so as to show, as far as possible, their mutual relations. In the consonants, *p* stands first, next *b* (see Plate I.); the rest follow in perfectly natural order, first the mute or explosive letters, proceeding from the lips to the throat; then the semi-vocals, or continuants in the same order; and lastly the nasals, liquids, coalescents, and aspirate. Scarcely more than half the consonants are essentially different; the articulations in the pairs *p* and *b*, *t* and *d*, *f* and *v*, &c., are precisely the same, but the sound is, so to speak, light in the first, and heavy in the second letter of each pair. The consonants in each pair are represented by strokes in the same position, and of the same shape, but that chosen for the second is written thick instead of thin; and thus not only is the memory not burdened with a multitude of signs, but the mind perceives that a thin stroke corresponds with a light articulation, and a thick stroke with a heavy articulation. *P, t, k, f, th(en), s, sh* are called light or sharp consonants, *f, th(in), s, sh* are further denominated whispered or breathed consonants; while *b, d, g, v, r, th(en), z, zh* are heavy, flat, spoken, or voiced consonants. The difference is, that in the flat letters (*b, d, g, &c.*) a vocal murmur is added to the action of the organs by which the sharp letters (*p, t, k, &c.*) are produced. The light sounds are also called *sounds*, while all the other letters (including *m, n, ng, l, r, w, v, &* the vowels) are called *sonants*. *th* and *j* are double consonants, formed by the union of *t, sh*, and *d, zh*, as may be heard in *fetch, cheap; edge, jem*. They are placed, in the alphabet, next to the first elements *t, d*, which enter into their composition. The vowels are arranged naturally in two series, the first guttural and the second labial. Each series commences with the most open sound. The short vowels are represented by light dots and strokes, and their corresponding long sounds by heavy ones. After a few weeks' practice in writing phonography, the heavy strokes and dots are made without any perceptible effort; they are traced by the pen with as much facility as then corresponding heavy sounds are produced by the organs of speech.

Manner of Writing the Consonants.—With one exception (see "upward *r*," next page), every right-line and curve employed in phonography is written in the direction


of one of the lines in the following diagram:—

—all straight lines and curves in direction 2 and the curves in direction 4 being inclined midway between a perpendicular and a horizontal line.

The consonants should be made about one-sixth of an inch in length. (See Alphabet in Plate I.) This size is best adapted for the learner, and insures accuracy and neatness in the writing. When he can write with ease, the size may advantageously be reduced to one-eighth of an inch. Particular attention should be paid to the forms of the curved thick letters; if they are made heavy throughout, they present a clumsy appearance; they should be thickened in the middle only, and taper off at each end.

Perpendicular and sloping letters are written from top to bottom, and horizontal letters from left to right. *L*, when standing alone, is written upward, and *sh* downward. *L* and *sh*, joined to other consonants, may be written either upward or downward, as may be convenient.

All the consonants in a word should be written without lifting the pen, the second letter beginning where the first ends, and so on. When a straight consonant is repeated, no break should be made between the two strokes; thus, *kk*. When a curved consonant is repeated, the

curve should not be written larger, but be repeated; thus,  *mm*. Single consonants, and combinations of consonants that contain but one descending stroke, rest upon the line. When two descending letters are joined, the first should be made down to the line, and the second below.

Upward R.—As the straight line in direction 4, in foregoing diagram, may be written either up or down, it is made to represent two letters, namely *ch* when written downward, and *r* when written upward; this additional sign being given to *r* for convenience and speed in writing. To diminish the risk of *ch* and *r* being mistaken for each other, when standing alone, *ch* is made to slope sixty degrees from the horizontal and *r* thirty. This line naturally takes these slopes when struck by the hand downward and upward respectively. When *r* has to be written alone, or joined to the circle-*s* only, either the upward or the downward letter may be used. When joined to other letters, *ch* and *r* are readily distinguished by the direction of the stroke. (See Plate II.)

Circle S and Z.—*S* and *z*, on account of their frequent occurrence, are furnished with an additional character, particularly convenient for joining, thus *o s* or *z*. When the *s* circle is joined to straight letters it is written on the upper side of *l*, and on the corresponding side of the other letters. When joined to curved letters it is written inside the curve. Between two consonants it takes the shortest direction. When the circle *s* is joined to *l* only the consonant is written upward, and when joined to *sh* only it is written downward.

Long Vowels.—There are six simple long vowels in the English language, viz.:—

ah, *a*, *e*; *aw*, *o*, *oo*;
as in *alm*, *ale*, *cel*; *all*, *ope*, *fool*.

(See the phonographic signs in Plate I.) The first three vowels are represented by a dot and the last three by a short stroke or dash, written at right angles to the consonant. These vowel-signs are there written to the letter *t* to show their respective places, namely, at the beginning, middle, and end of a consonant.

All the vowels should be pronounced as single sounds, that is, *ah* as heard at the beginning of *alm*, and not as *a* with *h*; *a* as in *ape*; *e* as in *cel*; *aw* as in *are*, not as *a* double-*you*; *o* as in *ore*; *oo* as in *ooze*.

Method of Placing the Vowels.—When a vowel is placed on the left-hand side of a perpendicular or sloping consonant it is read before the consonant, and when placed on the right-hand side it is read after the consonant. A vowel placed above a horizontal letter is read before the consonant, and when written under is read after the consonant. This, it may be observed, is the way in which we read all European languages, namely, from left to right and from top to bottom. As shown in Plate I, the vowels are written at the side of the consonant, in three places, at the beginning, middle, and end; the beginning of the consonant, whether written upward or downward, being the place of the first vowel-sign *ah*. The letter *l*, for instance, when written downward, has its vowels' places reckoned downward, and when it is written upward the vowels are reckoned from the bottom upward.

Vowels placed at the beginning of a consonant (*ah* and *aw*, for example) are called *first-place vowels*, vowels written in the middle are called *second-place vowels*, and those written at the end are called *third-place vowels*. The vowel points and strokes must be written at a little distance from the consonants to which they are placed. If allowed to touch, except in a few cases, they would occasion mistakes.

Short Vowels.—Besides the six long vowels just explained there are in English six short vowels, viz.:—

ä, *ë*, *i*; *ö*, *ü*, *öö*;
as in *pat*, *pät*, *püt*; *not*, *nut*, *foot*.

In producing these sounds the positions of the vocal organs are nearly the same as in uttering the long vowels in

palm, *pate*, *peat*; *nought*, *note*, *food*;

the chief difference being that the former vowels are more rapidly pronounced. The short vowels are represented by dots and strokes written in the same places as for the long ones, but made lighter, to indicate their brief character (see Plate I.)

These short vowels should not be called No. 1, short *ah*; No. 2, short *ee*; No. 3, short *i* (*eye*), &c., but No. 1, short *ah*; No. 2, short *ch*; No. 3, short *ee*, &c. It will be found convenient when speaking of these short vowels to affix the letter *t* to each, and call them severally *at*, *et*, *it*, *ot*, *ut*, *ot*.

Diphthongs.—The double vowels heard in the words *ae*, *owl*, *ay*, *boy* are represented by small angular marks (see Plate I.) *I* and *ow* are close diphthongs, accented on the second element, and *ai* (*yes*), *oi* are open diphthongs, accented on the first element. Each is pronounced as one syllable. The signs for *i*, *ow* may be written in any place with respect to a consonant; *ai* and *oi* are written in the first place.

Double Letters of the W and Y Series.—The letters *w* and *y* are unlike any other consonants. They are, in fact, consonants made from vowels, *w* being a modification of *oo*, and *y* a modification of *ee*, as may be heard in pronouncing

wah, *wch*, *wih* (or *wée*); *war*, *wch*, *wuh* (or *woo*).

yah, *ych*, *yih* (or *yee*); *yar*, *ych*, *yuh* (or *yoo*).

It has been found expedient to represent these letters in connection with the succeeding vowel by a single sign having a vowel character (see Plate I.) These signs like those for the simple vowels, are written heavy for long vowels and light for short ones.

They are written in the same position as the signs for the six pure vowels already learned. The *w* signs represent the form of the mouth in pronouncing *o* or *oo*, thus *Ö*; and the *y* signs represent the shape of the mouth in pronouncing *e* or *ee*, thus *Ë*. The second *ö*, slightly longer, is joined to the upward *l* to make the double consonant *öl*.

The shorthand signs for the diphthongs and double and triple letters of the *w* and *y* series are always written in the same direction, that is, they do not accommodate themselves to the consonant to which they may be written; as do the signs for the simple vowels *a*, *e*, *o*, *u*.

The Aspirate or Breathing H.—The aspirate *h* is in English only when preceding a vowel. It is generally expressed by a small dot prefixed to the vowel sign.

When it is more convenient to use a convenient form for this letter it is written either by the downward or upward stroke in Plate I, whichever may be most convenient for joining with the preceding or following letter.

The Circle and Stroke S.—The circle *s* is generally used in preference to the stroke *s*. It should be particularly observed that the circle *s* at the beginning of a word is always read first, and at the end of a word it is always read last. It may be made double-sized for *ss*, as in *passer*, *causes*.

When a word begins with a vowel followed by *s* or *z*, or ends with a vowel preceded by *s* or *z*, the stroke form of the letter is used. Indeed the stroke *s* is used whenever it is necessary to place a vowel to this consonant. The stroke *z* is used in all words that begin with *z*.

On Writing Phonetically.—In consequence of the deficiencies of the English alphabet and the unphonetic character of our orthography, the spelling of a word can seldom be taken as a guide to its pronunciation. To write any given word, therefore, phonographically, its several sounds must first be ascertained; the student should then write the phonographic letters which represent them. The

practice of phonography will improve the student's pronunciation and train his ear to discriminate differences in orthoepy.

Localization of Words.—When a vowel comes between two consonants it is possible to write it either after the first or before the second. Care must be taken not to write the vowel sign in an angle between two letters where it would be doubtful to which of the two consonants it belonged. The three following rules embrace the greater number of cases.

First-place Vowels are written after the first consonant.

Second-place Vowels are written after the first consonant when long, and before the second when short. (It is thus known whether a second-place vowel is intended to express a long or a short vowel independently of the heaviness or lightness of the vowel sign.)

Third-place Vowels are written before the second consonant.

If the second consonant is the circle *s* the vowel must necessarily be written after the first consonant.

When the diphthongs *ow*, *er* are written by themselves for the words *low*, *her*, the sign for *i* is placed above the line and that for *ow* on the line. When either of these diphthongs commences a word the first place is the most convenient; in other cases they are both more easily written in the third place.

Initial L and R Hooks.—The simple articulations *p*, *b*, *t*, *d*, &c., are often closely united with the liquids *l* and *r*, forming a kind of consonant diphthong, and pronounced by a single effort of the organs of speech; as in *plough*, *brow*, *try*, *drink*, &c. The natural way of expressing these combinations—writing would be habitually by some marked and uniform modification of the simple letters. It is effected by putting a hook on the right side of a straight downstroke to represent the addition of *l*, and on the left side to represent the addition of *r*. See Plate I., col. 3, 4.

As a curve cannot receive a hook on both sides of the stroke, and as the *r* compounds are much more frequent than the *l* compounds, a hook prefixed to a curve always adds *r* to the primary letter. See Plate I., column 4.

A series of curved hooked letters to represent the addition of *l* is produced by making a *large hook*. Of this series only *rl*, *cl*, *shl*, *nl* will be required in writing English, and these letters occur but seldom. See Plate I., column 5.

The most useful letters in the curved *l* and *r* series, *rl*, *rl*, *pr*, *or*, *thr*, have duplicate forms, namely, the opposite curves of *p* and *th* in addition to the regularly formed letters; the downward *r* at its requiring to be hooked for *pr*, &c.

In these hooked letters the hook must not be considered as a distinct stem as the primary letter; but the whole form must be taken to represent the consonant diphthong considered as a whole; and in no case can the *r* be read first. The left-hand hook was selected for the *r* series and the right-hand hook for the *l* series in the straight letters. Because the combinations *pr*, *tr*, &c., occur five times as often as *pl*, *tl*, &c., and the left-hand hook is the best sign for writing both when occurring singly and when joined to other letters.

When speaking of these double consonants as, for instance, in a phonographic class it will be found convenient to pronounce them with monosyllabic names, thus *tr* should not be called *te ar*, but *ter*; *pr* (*ptpr*), *tl* (*ttl*), *pl* (*petl*), &c. A distinction is thus made between *p*, *l*, pronounced as two letters, and *pl* pronounced as one.

Shl, *shr*, *shn*, and *rt* upward, and *bu* downward, must never stand alone, because they would then be read as other letters.

The upward letters for *w*, *uh*, *y*, and both the upward and downward *h*, may be hooked at the end for *n* and *l* and for *t* or *d*. A letter with an initial or final hook

(or both an initial and final hook) may be written half-length for the expression of either *t* or *d*; thus the double consonant *kl*, made half-length, will represent either *klt* or *kld*.

Tick H.—The downward *h* may be reduced to a tick before *m*, *l*, *r*, and before any hooked letter to which the tick can be joined. This tick *h*, when employed before *m* or *l*, cannot be conveniently used when a first-place vowel follows.

SPR Series of Consonants.—From the *pr* series of double consonants, a series of treble consonants is formed by making the hook into a circle. (See Plate I.) These treble consonants are used only initially. There is no danger of *spr*, *str*, *skr* being read as *sp*, *st*, *sk*, because in the latter case the circle *s* is always written on the upper or right-hand side.

N Hook.—*N* following a straight letter is expressed by a final hook on the left-hand side of a perpendicular stroke, and on the corresponding side of any other straight letter. See Plate I., column 5.

By making the hook into a circle, *s* or *z* is added; thus *tones*, *trains*, are written like *tone* (*t* with *n* hook, and the long vowel *o* on the right side), *train*, except that in the latter words the *t* stroke ends with a hook, and in the former words with a circle. This circle on the left means *us* only when it occurs at the end of a word. The *us* circle is made double size for *uses*, as in the plural form, *expenses*.

A hook at the end of a curve always adds *n* (as a hook at the beginning of a curve always adds *r*). *S* or *z* is added, in this case, by making a small circle at the end of the hook.

F or V Hook.—*F* or *v*, when following a straight letter, is expressed by a final hook on the right-hand side of a perpendicular stroke, and on the corresponding side of any other straight letter. It is written on the opposite side to the *n* hook. There is no *f* or *v* hook to curved letters.

-tion Hook.—The termination *-tion* (*shn*) is expressed by a large final hook. When it follows a curve it is written on the inner side, like the final *n* hook. It may be written on either side of a straight line.

The *n*, *f*, and *-tion* hooks may be used in the middle of a word when the following consonant can be conveniently joined.

Halving Principle, adding T or D.—By halving any of the preceding letters, whether single, double, or treble (except *ng*, *mp* or *mb*, *tr*, *rch*, or *ry*), *t* or *d* is added, according as the letter is thin or thick; *t* being generally added when the letter is thin, and *d* when it is thick. See Plate I., last column of the single and double consonants.

A vowel before a half-sized consonant is read before both letters. A vowel after a half-sized consonant is read next to the primary single, double, or treble letter.

As will be seen in Plate I., column 6, *m*, *n*, *l*, and *r* are shortened for the addition of *t*, and these shortened strokes, when thickened, represented *md*, *nd*, *ld*, *rd*.

ST and STR Loops.—*St* is written by a loop about half as long as a consonant. This loop is used chiefly as initial or final, but it may be employed medially when the loop can be distinctly formed. A loop about two-thirds as long as a consonant represents *str*.

S-TION Hook.—A hook made by continuing the *s* circle to the other side of the consonant, adds *-tion* (*shn*) or *-sion* (*zhn*).

Lengthened Curve, adding THR.—When a curved consonant is written twice its usual length, it expresses the addition of *thr*, *tr*, or *dr*; but *ng* and *mp*, when doubled, become *nker* or *nger*, *mper* or *mber*; thus, *t* written twice its length represents *thr* (*letter*); *f* twice its usual length is *fthr* (*father*); a long *m* is *mtr* (*matter*); *ch*, long *mb*, *r*, make *chubers* (*chambers*).

Vocalization of the PL, PR Series of Consonants.—One of the long vowels *ah*, *eh*, *u* may be expressed between

the two letters of one of the *pl, pr* series of consonants, by a small circle before a downstroke, or above a horizontal one.

The *short vowels* *ä, ê, i*, are written by a small circle placed *after* a downstroke or *under* a horizontal one. A stroke vowel is struck *through* the consonant.

Prefixes and Affixes.—A few prefixes and affixes are expressed each by its leading letter written near the other part of the word; thus *NT* (half-length *n*) represents *inter* or *intro*; *M, magna* or *magni*; *S* (circle), *self*; *L, ly*; *SH, ship*. The commonest English prefix, *com* or *con*, is written by a dot at the beginning of the word (or by writing the remainder of the word close to the preceding word); and the most frequent endings, *ing*, by a dot at the end.

These prefixes and affixes, together with the various rules just given for the writing of double and treble consonants by single strokes, will be sufficiently exemplified in the specimens of shorthand given in Plate II.

Method of Practice.—The learner should not attempt at first to bring into use all the abbreviating principles here introduced. He should be content to practise, for two or three weeks, a rather lengthened style of phonography, making much use of the simple consonants, until he feels confidence in the use of the phonographic characters, and in the principle of phonetic spelling. He may then gradually adopt the double and treble letters, and the prefixes and affixes, &c., as he requires them; that is, as he feels that the style he is employing is not brief enough for the manual dexterity he has acquired. In selecting one out of two or more possible forms for any word, the student must recollect that great ease in writing, and consequently the saving of time, is not secured by using hooked and grouped, and especially half-sized letters, on all possible occasions; but he must learn to make a judicious selection, and employ those which are most readily made in any given case, and not adopt those forms that merely take up the least room.

The pupil should spend as much time in reading as in writing phonography. Printed rather than manuscript phonography should be selected for this purpose. To those who wish to excel in phonography as an Art, the perusal of two or three shorthand volumes is recommended before a rapid style of writing is acquired, in order that the style may be formed on a correct model. When learning, the following method of practice will be found useful:—Take a specimen of printed shorthand and copy it out in longhand; then transcribe the article into phonetic shorthand from the longhand copy, and compare the shorthand exercise with the original: correct, if necessary, and rewrite. This course should be continued until a correct style is obtained.

Grammalogues.—Phonography may be written either in full or in brief. Full phonography signifies the expression of every vowel and consonant in a word by its shorthand letter. In abbreviated phonography every word of frequent occurrence is represented by one of its prominent letters. These words are called *grammalogues* or *letter-words*, and the letters that represent them are called *logograms* or *word-letters*. Thus, each of the following words in line 1 is represented by the under-written shorthand letter in line 2, which letter forms part of the word when written in full.

1. *of, to, for, it, be, are, have, which.*
2. *ö, öö, fr, t, b, r, r, ch.*

There are two styles of abbreviated phonography, called the First and Second styles. The First style is used in correspondence, and for all general purposes; and the Second style is employed by reporters. The styles differ chiefly in the number of grammalogues employed. A complete list of the grammalogues of the Corresponding style

is given in Plate I. Those marked (*) cannot be employed on unruled paper; these words should have their remaining consonants or vowels inserted.

The stroke-vowels *aw, o, oo*, are used as logograms in each of these directions $\swarrow \searrow$. The dash \diagup represents the common word *and*; this sign being serviceable in phraseography, where the vowel *dot* of this word could not be used.

Has, his, may be written either by placing the aspirate dot before the circle *s* which represents *as, is*, or by thickening the circle on one side.

In general, the positions of the grammalogues, *above, on, and through* the line, are determined by their vowels; and in the case of a word of more than one syllable, by its accented vowel. The positions of words, as determined by their vowels, are:—For perpendicular and sloping strokes, 1, *ah, aw, i, oi*, above the line; 2, *ä, o, u*, on the line; 3, *e, oo, ow, ü*, through the line. Words containing the corresponding short vowels follow the same rule.

Vowel logograms and half-sized and horizontal consonants have but two positions:—1, *ah, aw, i, oi*, above the line; 2, *ä, o, e, oo, or, ü*, on the line. A third position, *under* the line, for *i, oo, ow, ü*, would not be distinguishable from the second when writing on unruled paper.

Double-length horizontal curves take two positions, *above* and *on* the line; all other double-length curves have but one position, *l* being written *on* the line, and all other letters *through* the line.

Position of Words.—Phonographers who wish to become reporters should cherish reporting habits as soon as they can write the system fluently. In following a rapid speaker it is impossible to insert many vowels. If then we can, by a difference in the position of a consonant outline, indicate the vowel, or principal vowel, of the word, it will facilitate the reading of the report. In the reporting style, a word whose consonant outline is less than two perpendicular strokes in depth, is written in position, in accordance with its vowel, or accented vowel, as just explained. No advantage would arise from placing in position a word that occupies the space of two or more perpendicular strokes, because in such cases there is seldom any other word written by the same outline for which it could be mistaken if left unvocalized.

Vocalization of Half-length Consonants.—When the circle *s* follows a half-sized consonant it must be read after the *t* or *d* added to the primary letter, thus, *S, pat, So pats* (not *past*). No final vowel can be placed after the *t* or *d* added by halving. This rule requires particular attention.

Two Vowels Concurring.—When two vowels occur either before or after a consonant, the vowel that is sounded nearest to the consonant should be written nearest to it. When two vowels occur between two consonants, one is placed to each.

Dissyllabic Diphthongs.—The following form a series:

<i>ah-e,</i>	<i>eh-e,</i>	<i>ee-e,</i>	<i>aw-e,</i>	<i>o-e,</i>	<i>oo-e.</i>

This series of signs may represent diphthongs composed of an accented long vowel and any short vowel except *oo*; thus, the first sign may be written in *sollang* and *colours*, also for *ay* (yes); the second in *saying*, *clergy*, *created*, *bayonet*; the third in *being*, *real*, *theory*, *unsound*; the fourth in both *soil* (one syllable) and *saving* (two syllables), &c. In *alien*, *folio*, &c., the *yah* series of vowels should be used, rather than the third of the above series.

Scotch Guttural CH.—The Scotch guttural *ch* (heard also in German, Irish, Welsh, and other languages), and the German *g* in *sieg* (victory), are written thus, $\text{—} \text{gh}$.

Consonant Outlines.—As two letters in the phonographic alphabet (namely *c*, *v*) have duplicate forms, *w*, *g*, *h* three forms, and two others (*sh*, *l*) may be written either upward or downward, and as many groups of consonants may be expressed either by their alphabetic forms or by abbreviations, it is evident that many words may be written in more than one way.

General Rule for Outlines.—For any given word the writer should choose that form which is most easily and rapidly written, and is at the same time capable of being clearly vocalized. The briefest outline to the eye is not always the most expeditious to the hand. The student will sensibly acquire a knowledge of the best forms by practice and observation, and especially by reading some book printed in phonography. The following special rules embrace the principal classes of words:—

Initial L.—When a downward initial *l* joins easily to the following letter, *l* is written downward if a vowel precedes and upward otherwise; thus downward in *alike*, *allow*, *elude*, and upward in *like*, *lament*.

Final L.—After *f*, or the upward *r*, *l* is written downward with the *l*, and upward if followed by a vowel. After *s*, *sh* (downward), *ng* and *n*, the downward *l* is most convenient. After *t*, *ch*, *k*, *sh* (upward) *g* (stroke), *th* (*l* upward), *r* (downward), *m*, and *sh*, use the upward *l*; also after the circle *s*, except when preceded by *t*, *th*, or *n*. The corresponding long letters follow the same rules.

Initial R.—When *r* is initial and is followed by *p*, *k*, *sh*, *s* (stroke or circle), *l*, *r*, or *n* (stroke or hook), the down-stroke is used if a vowel precedes, and the up-stroke otherwise; thus the downward *r* is written in *ark*, *ark*, and the upward *r* in *rock*, *rock*.

Long R.—A *l* and *r* without a hook, circle, or loop is written upward if a vowel follows the *r*, and otherwise downward; thus, in the following pairs of words the downward *r* is written in the first word, and the upward *r* in the second: *air*, *rain*; *tare*, *torq*; *fear*, *fair*; *quar*, *prize*; *cur*, *curry*; *cheer*, *chorus*; *sister*, *hobnob*; *Sar*, *sorrow*; *earn*, *ruin*; *airs*, *rose*; (*con*)cern.

The rule for the downward final *r* does not apply when it would carry a word more than one descending stroke below the line; as *prepare* (*pr*, *p*, *r*), *Shakespeare* (*sh*, *ks*, *p*, *r*). The upward *r* is always written after a straight up-stroke, as *more* (*r*), *core* (*or*, *r*).

In the case of a word that contains no other stroke, consonant *th* or *r*, both preceded and followed by a vowel, the downward stroke is best, as in *area*, *areas*, *array*, *arrows*, &c.

Contractions.—When *p* occurs between *m* and *t*, *t* between *s* and *l* or *st* or *con* or *nt*, or *l* between *ng* and *sh* or *ng* and *t*, the *p*, *t*, or *l* may be omitted without danger of ambiguity.

Tick TH.—*The*, the most frequent word in the English language, may be expressed by a short slanting stroke *z* joined to the preceding word, and generally written downward; thus, for *in the*, *for the*, *of the*, *with the*, *to the*, &c., the respective logograms for *in*, *for*, &c., and attach the short slanting stroke. When more convenient this tick is written upward, as in *at the*. The tick *the* never forms a phrase.

Of the.—The connective phrase "of the" is intimated by writing the words between which it occurs near to each other, thus showing that the one is of the other; thus, in the phrase *lore of the beautiful* write *beautiful* close to *lore*. Although this mode of expressing *of the* is also employed in some cases for the prefix *con* or *com*, it is found that this double use of the expedient of proximity causes no difficulty in reading.

A or An.—*A* or *an* is joined to the preceding word by *o* or *u*; thus, for *if a*, *in a*, *with a*, write the logograms for *for*, *in*, *with*, and join the short perpendicular stroke;

and for *at a*, *on a*, write the logograms for *at*, *on*, and join the short horizontal stroke.

The pupil is recommended to be sparing in his use of contractions in the commencement of his practice. In the reporting style every legible contraction may be brought into use.

Phraseography.—In longhand swift writers join all the letters of a word together, and sometimes write several words without lifting the pen. In phonography also several words may often be united. This practice, which is called phraseography, gives great assistance to the writer in following a rapid speaker. Several examples will be found in the specimens of phonography in Plate II.

Punctuation.—*Stops* should be written in the usual way, except the period, for which a small cross is used. The hyphen is written thus, *—*; the dash thus, *---*

! exclamation; *?* a smile.

Accent may be shown by writing a small cross close to the vowel of the accented syllable. It is, however, more convenient to use phonetic longhand when marking the accent of a word. See PHONETIC WRITING.

Emphasis is marked as in longhand, by drawing one, two, or more lines underneath; a single line under a single word must be made wave-like to distinguish it from *—l*. In preparing manuscript for the press a single line thus drawn underneath (wavy for a single word, and straight for more than one) signifies *italic*, two lines (which need not be wavy) SMALL CAPITALS, and three lines LARGE CAPITALS. For *ITALIC CAPITALS* draw three lines, and write *It* *lie* at the commencement.

An *Initial Capital* is marked by two short sloping lines, like the hyphen, under the first consonant of the word.

Figures are written as usual, or the words may be expressed in phonography.

Readers—Practice and persevere. Such is the advice with which Mr. Pitman closes his "Manual of Phonography," the substance of which we have, by permission, given in this article, though necessarily, for the sake of brevity, without its numerous engraved illustrations of words in shorthand, under the several rules for writing.

SHOULDER and SHOULDER GIRDLE. See the Plate and article ARM, which includes *Shoulder* and *Hand*.

SHOVE GROAT was an old game of English taverns, to which it descended from more aristocratic homes. It is immortalized by a saying of Falstaff's, "Quoit him down, Randolph, like a shove-groat shilling" (2 Henry IV. ii. 1.) Falstaff means that Pistol is to be pushed downstairs as swiftly as the shove-groat shilling flies along the board towards its mark in the game. So also Ben Jonson—"Made it run as smooth off the tongue as a shove-groat shilling." Shove-groat was prohibited as a new and dangerous gambling game by 33 Henry VIII., and no doubt was after that not so often seen in noble houses; but it seems to have survived the tyrant's thunder in the obscurity of the taverns. Other names for the game were slide-groat, slide-board, and slip-thrift. The special shove-groat shilling of the great Elizabethans was the broad shilling piece of Edward VI., no doubt giving better play than the original groat. It is not certain, but everything points to shove-groat being practically the same game as shovel-board. Thus Master Slender ("Merry Wives of Windsor," i. 1) berates Pistol's robbery "of seven groats in mull sixpences and two Edward shovel-boards, that cost me two shillings and twopence a piece." These were, no doubt, well-worn coins that slipped easily along, and commanded a high price from the sellers of the day.

SHOVEL BOARD or SHUFFLE BOARD. See SHOVE GROAT.

SHOVEL, SIR CLOUDESLEY, a celebrated English admiral, was born in 1650, of poor parents. He was

first noticed by Sir John Narborough, with whom he went to sea as a cabin-boy, but from his merit soon rose to the rank of an officer. In 1675 he was appointed to the command of a ship for his services in enabling Narborough to burn the vessels of the Dey of Tripoli. On the accession of William he espoused his cause with great zeal, distinguished himself in the battle of Bantry Bay, and obtained the honour of knighthood. In 1692 he was appointed rear-admiral of the red, and soon after greatly contributed to the victory of La Hogue. In 1694 he held the chief command in the expedition against Dunkerque; in 1704 led the van in the battle of Malaga; in 1705 took an active share in the capture of Barcelona; in 1707 he joined the Duke of Savoy in the siege of Toulon, after the raising of which he proceeded homeward with nine ships of the line, and was unfortunately wrecked off the Scilly Isles on 22nd October, 1707.

SHOVELLER (*Spatula* or *Rhyncaspis clypeata*) is a British Duck, distinguished by the great width of the extremity of the bill; the upper mandible is terminated by a strongly hooked nail, and the lamellæ are long and very delicate. The shoveller is not abundant in Britain, and is rather locally distributed. It breeds in the northern parts of both hemispheres, passing south in winter. The male is a handsome bird, a little smaller than the mallard. The head is dark green, the back deep brown, with the scapulars white, the lesser wing coverts blue, and the speculum green, bordered with white; the throat is pure white, and the breast and flank a rich bay. The female very much resembles the female of the wild duck. The shoveller inhabits inland marshes, lakes, and rivers. The flesh is highly esteemed.

SHREW (Soricidae) is a large family of INSECTIVORA, containing nearly half the known species of that order. The shrews have a mouse-like body, with a small, long head, terminated by a long, slender, pointed muzzle; the limbs are short and furnished with five toes; the eyes are small; the tail is long. The species are distributed over all parts of the Old World, and occur also in North America.

The Common Shrew (*Sorex vulgaris*) is found in Britain, and also throughout Europe and Northern Asia, extending to North America. The body is about 2½ inches in length, covered with a dense soft fur, which varies in colour above from light red to dark brown, and is grayish below. Along each side of the body, under the ordinary fur, is found a little line of stiff and close-set bristles covering a gland which secretes an odorous fluid. The tail is quadrangular in shape, and rather shorter than the body. There are thirty-two teeth, tipped with deep crimson; the middle incisors in both jaws are large, the upper ones being hooked and notched at the base. This species frequents dry pasture grounds, hedge-tows, and well-drained plantations, where it feeds on worms, insects, and slugs. Its well-marked snout is used in turning up the grass, dried leaves, &c. It is of a very quarrelsome disposition, and is seldom met with in pairs, except at the breeding season. The female shrew brings forth from five to seven young in spring, which she places in a nest of soft herbage, formed in a hollow on the ground or on the face of a sloping bank. The shrew is preyed on by moles, weasels, cats, owls, shrikes, &c. Some curious superstitions were formerly held regarding the shrew, this harmless little animal being thought to cause injury or death to any animal over whom it ran.

The Pigmy Shrew (*Sorex pygmaeus*) is the smallest of British mammals, the body measuring less than 2 inches. It is less common than the preceding species in England and Scotland, but is found also in Ireland, where the common shrew does not occur. In its habits it resembles the common species.

The Water Shrew (*Crossopus fodiens*) is nearly black

above and white beneath. The tail is about two-thirds the length of the body; the feet and tail are fringed with strong white hairs. Its length, including the tail, is about 5½ inches. It frequents ditches and slow-running streams in meadows, &c. It feeds on crustaceans, water insects and their larvæ, small fishes, frogs, &c. When disturbed it at once dives and finds its way to the side under water, where its hole has openings that communicate with the stream. It swims with great quickness. The female produces from five to eight young ones. The snout of this species is shorter and blunter than that of the common shrew; the eyes are comparatively smaller, and there are only forty teeth, tipped with brown or red. It is distributed throughout Europe, and occurs in England and Scotland. The Oared Shrew is merely a variety of this species.

The Garden Shrews (*Crocidura*) are small species, with twenty-eight to thirty white-tipped teeth; two species are common in Europe, but do not occur in Britain.

SHREW MOLE (*Scalops aquaticus*) is a species of MOLE (Talpidæ) abundant in the eastern parts of North America, forming the common mole of the United States. The shrew mole has a short, thick, cylindrical body, about 7½ inches in length, covered with grayish scales, varied with brown. The limbs are very short and five-toed, the hind toes being webbed; the tail is short and very scantily clothed with hair. The head terminates in an elongated slender snout, naked at the tip. The eyes are very small and concealed by the fur. There are thirty-six teeth in all, in the upper jaw there are on each side three incisors, of which the first is very large, and the other two very small, one canine, three premolars, and three large molars furnished with strong cusps; in the lower jaw there are only two incisors on each side, of which the inner is the smaller, no canines, three premolars, and three molars. The shrew mole resembles the common European mole in its habits, burrowing beneath the ground. In the western parts of the United States are found two other species of shrew moles, the Prairie Mole (*Scalops aquaticus*), with a silvery fur, inhabiting the western prairies, and the Texas Shrew Mole (*Scalops latimanus*), with a long black fur, inhabiting Mexico and Texas. Two other species inhabit the United States, which do not have 42 forty-four teeth, and hence have been placed in a distinct genus, *Scapanus*.

SHREWSBURY, a parliamentary and municipal borough of England, in Shropshire, of which it is the county town, 162 miles from London by the North-western Railway, or 171 by the Great Western line, is situated chiefly on a peninsula formed by the waters of the Severn, across which are two stone bridges, one of five arches called Welsh Bridge, and the other of seven arches called English Bridge, each structure being viewed from the direction in which it leads. On the opposite banks are the suburbs of the town. The "Quarry" forms a fine river promenade, planted in 1719 with a noble avenue of lime trees. A very handsome iron bridge now connects the town with a suburb called Kingsland. Few provincial towns can vie with Shrewsbury in the number of ancient family mansions of the county gentry. The old streets are irregularly laid out and narrow, but in the modern portions of the town they are broad and well paved. There are some remains of the Benedictine abbey founded by Roger Montgomery in 1083. The abbey church, a cruciform structure, was in great part demolished at the dissolution. The remains constitute the parish church of Holy Cross. St. Alkmund's was erected on the site of one founded by King Alfred's daughter, Eilfreda. St. Chad's has also been rebuilt. St. Julian's was rebuilt about the middle of the last century; but the tower, which is of Norman architecture, belonged to the old church. St. Mary's is an ancient, large, and fine cruciform structure, of Norman and Early English architecture, with a spire of

220 feet. There are several other churches and fourteen or fifteen chapels. A cemetery of 20 acres has been laid out about a mile from the town. The grammar-school, founded by Edward VI., justly ranks as one of the first in the kingdom. The old buildings are now used as a free library and museum, and the school is carried on in the suburb of Kingsland. Sir Philip Sidney received his education here. The public monuments of Shrewsbury include a statue of Lord Clive by Marochetti, and a Doric column (having an altitude of 200 feet), erected to the memory of General Lord Hill. Among the principal buildings may be mentioned the town and shire hall, built by Shrike, a spacious and handsome stone edifice; the gaol and house of correction, by Telford; the military depot, a handsome brick erection near the Abbey-Foregate; the workhouse, the corn exchange, market hall; the theatre, in a portion of the ancient palace of Powysland; and the Shropshire and North Wales Natural History and Antiquarian Society's Museum, which contains many relics from the Roman city of Wroxeter and several skulls of ancient Britons. There are also assembly and other public rooms, a working men's hall, a literary and philosophical society, music hall, five banks, military barracks, water-works, a cattle market, &c. The schools, almshouses, and other charities are numerous and well endowed, one of the former (Milington's) possessing an annual revenue of more than £1200; an hospital is attached to it. The county infirmary was founded in 1745; the county lunatic asylum was built in 1840, in the Elizabethan style. Races take place at Mockton, about half a mile from the town. The trade of the town is considerable, especially in Welsh cloths and flannel from the counties of Denbigh, Montgomery, and Merioneth; thread, linen yarn, canvas, and shoes are manufactured, and there are iron works at Cefn M. The town has also some glass-painting works and extensive malt-houses and breweries. Shrewsbury is also celebrated for its brawn and cakes. It has twelve copartnate trading companies, a salmon fishery in the river, and a brisk business in coal and corn. The Severn is navigable for boats of 30 or 40 tons, and there is a branch of the Grand Junction Canal to Wombidge (constructed by Telford in 1793), which opens a communication with the Staffordshire potteries. The borough returned two members to Parliament from 1298 to 1885, when the representation was reduced to one member. The population in 1881 was 26,478. The municipal borough, co-extensive with the parliamentary borough, is divided into five wards, and is governed by ten aldermen and thirty councillors. Assizes and sessions for the county, as well as sessions for the borough, are held here. The annals of the town are interesting. It was founded in the fifth century (upon the decay of the Roman *Eboracum* or *Winneter*) by the British kings of Powysland, who made it their capital, under the name of *Powysland*, which their English successors translated into *Scrobblesgreag*, both being derived from the alder and willows which abounded in the locality. The place is described at considerable length in the Domesday survey. There are still some remains of the town walls built in the reign of Henry III. A Parliament was held here by Edward I. in 1283, and one by Richard II. in 1397. A great battle was fought beneath its walls between Henry IV. and Henry Hotspur, the son of the Earl of Northumberland, assisted by the Earl of Douglas, in 1403, in which Hotspur was slain and the Prince of Wales, afterwards Henry V., first distinguished himself in the field. The scene of the contest is still called Battlefield. Shrewsbury was captured by the Parliamentary forces in 1644. Among the most interesting remains of antiquity at Shrewsbury are the stone gateway of the abbey, and the keep of the castle (100 feet square), the latter built into a private house by Telford; the ancient council house; clothworkers' hall, &c.

SHRIKE (*Laniidae*) is a family of birds belonging to the dentirostral section of the order Passeres. The bill is stout, more or less compressed, hooked at the tip, with the upper mandible armed with a prominent notch near the tip, and the base beset with stout bristles. The smaller species feed on insects, which they take in the same manner as the flycatchers, but the more powerful species prey also upon birds, mice, and reptiles; in these the claws are sharp and fine, and assist as instruments of capture or prehension. Many of the shrikes have the habit of impaling their prey on thorns, &c., whence they are called butcher-birds. The species are numerous and found in every part of the world except South America.

The Great Gray Shrike or Great Butcher-bird (*Lanius excubitor*) is a tolerably regular winter visitor to Britain, but never breeds in this country; it is common in the north of France and other parts of Northern Europe. It is about 9½ inches in length. The plumage is pearly gray above, with the lower region of the eye and ear-coverts black; the cheeks and under surface are nearly white; the wings are black, with a white bar near the base of each feather; the tail is black with a white tip, the latter colour increasing in extent towards the outermost feathers; the bill is black; the legs are slender and nearly black. The gray



Butcher-bird (*Lanius excubitor*).

shrike feeds upon mice, shrews, small birds, frogs, lizards, and large insects. It is a bold and combative bird, attacking crows and other birds much larger than itself when they come into its haunts; and it has even been used instead of a falcon to fly at small birds. The foreign falconers often make a very different use of it, employing it in trapping hawks during the autumn and winter. The shrike is fastened to the ground, and, on the approach of the hawk, begins screaming loudly, and thus gives the falconer notice of the fact; from this it is called *excubitor*, or the sentinel. The nest is generally built on trees, and is composed of grass-stalks, roots, and moss, with a lining of down or wool. The eggs, from four to six, are bluish or grayish-white, spotted on the larger end with light brown and ash.

The Red-backed Shrike (*Lanius collurio*) is the most abundant British species, arriving in this country in April or May, and departing, after breeding, in September. It is rather local in its distribution, and is most common in the South of England, rarely reaching as far north as Scotland. It is found on the Continent as far north as Norway and Sweden, and passes the winter in Africa, extending to the Cape of Good Hope. It is about 7½ inches in length. The male bird has the head and neck gray, a band on the cheeks black, the back and wing-coverts chestnut, the upper tail-coverts gray, the wings black, margined with red, and the whole lower surface pale red. The female is of a general dull brown colour, with the lower surface barred with grayish-white. The red-backed shrike feeds chiefly on insects, particularly cockchafer, but also on mice, shrews, and small birds. Like the preceding species, it has the singular habit of hanging up its prey,

either by fixing it in the forked branch of a tree or shrub or by impaling it upon a thorn, so as to pluck off the feathers of birds and tear away their limbs with more facility; even its insect prey is served in the same manner. The nest is large, cup-shaped, and placed in a strong hedge or thick bush.

The Woodchat (*Lanius rutilus*) is a rare visitor to Britain, though it breeds throughout Europe. It is about the same size as the red-backed shrike, but has the back of the head and neck bright bay, the back black, and the lower surface white.

SHRIMP is the name given to two small species of crustaceans belonging to the order DECAPODA, which also contains the lobsters and crabs. The Common Shrimp (*Crangon vulgaris*) resembles a lobster generally in appearance, but is only about $2\frac{1}{2}$ inches in length. It is distinguished by having the pincers on the first pair of walking limbs, which correspond to the great claws of the lobster, only slightly developed, by the second pair of walking limbs having small pincers and being long and slender like the third pair, by the fourth and fifth pairs being short and thick, by the rudimentary rostrum, and by the smoothness of the carapace.

The common shrimp is very abundant on sandy shores on nearly all parts of the coasts of Britain and Ireland, where it frequents the shallow water. It is of a pale glaucous green colour, dotted with gray, becoming brown, and not red, after boiling. During life the body is semi-transparent, and so closely resembles sea-water that the animal is with difficulty distinguished. Its ordinary motion consists of short darts or leaps. When alarmed it hastily buries itself in the sand by a peculiar movement of its fan-like caudal fin. This species is also common on the coasts of North America.

The second common British species of shrimp is *Pandalus annulicornis*, which inhabits deeper water than the common shrimp, and is chiefly taken on the eastern and southern coasts of England. It is from 2 to $2\frac{1}{2}$ inches long, and is of a reddish-gray colour, spotted with a deeper red; when boiled it becomes bright red like most other crustaceans. It is distinguished by the long spiny rostrum, by having all its walking limbs long and slender, with no pincers on the first, by the great length of the left limb of the second pair, and by the antennæ exceeding in length the whole body.

Several other species of *Crangon* occur on British coasts; and some of the smaller species of Palæmon, to which the PRawns belong, are sold as shrimps.

Shrimps form the food of herrings and other fishes, and of various aquatic birds. When boiled they are much esteemed as a delicacy for the table, and Pegwell Bay, near Ramsgate, has quite a reputation for supplying them to the London markets. On many parts of the British coast shrimp-fishing furnishes a profitable employment to boys and women, who wade up to their knees in sandy waters, pushing before them the shrimp net. This in form resembles a wide-mouthed bag, stretched by means of a short cross-beam, and attached to the end of a long pole. But a more wholesale way of fishing is by means of sweep-nets dragged over the fishing ground by a couple of boats.

SHROPSHIRE or **SA'LOP**, a county of England, bounded N. by Cheshire and a detached part of Flintshire; E. by Staffordshire; S.E., S., and S.W. by the counties of Worcester, Hereford, and Radnor; and W. and N.W. by Montgomeryshire and Denbighshire. The greatest length north to south is 46 miles, and the greatest breadth 37 miles. The area is 841,167 acres. The population in 1881 was 247,993.

Surface and Rivers.—Shropshire contains every variety of surface, from the rugged mountain to the fertile and cultivated valley. The river Severn separates it into two

nearly equal divisions, and forms a boundary between the more elevated districts of the west and south, and an extensive level on the north and north-east, which extends into Cheshire and Staffordshire. On the west various chains of Welsh mountains extend into Shropshire. The Breidden Hills, remarkable for their picturesque forms, are situated on the southern bank of the Severn, near where that river enters the county. Corndon Mountain is 1700 feet above the level of the sea. The hill called the Wrekin, near Wellington, rises 1320 feet above the sea and 1299 feet above the Severn, which flows at its foot; being nearly detached from all neighbouring hills, as well as considerably higher, it forms a conspicuous object; and the view from its summit, on a clear day, is one of the most extensive and majestic in England. The singular ridge called Wenlock Edge extends from the valley of the Onny to the Severn at Coalbrook Dale, a distance of about 20 miles. Wenlock Edge is flanked on the east by a number of detached rounded hills, extending from the Onny to the town of Wenlock, all of which are under 1000 feet in height, and, as well as the greater portion of Wenlock Edge, are under cultivation or planted to their summits. The Brown Clee Hills attain their greatest elevation in this county, in two peaks called Abdon Barf and Clee Barf, the former of which is 1806 feet above the sea, and the latter 1690 feet. A few miles south of the Brown Clee Hills, and connected with them by a tract of sandstone, are the Titterstone Clee Hills, attaining the height of 1730 feet, and presenting an extremely picturesque appearance in the scenery of this and adjoining counties.

Although Shropshire may be considered a well-cultivated county, yet there are extensive tracts of waste land, many portions of which might be improved with advantage. Some, indeed, of the elevated districts are too barren or rugged to admit of cultivation, but they afford herbage for sheep. Clun Forest is not a wooded tract, but consists of smooth rounded hills, which were formerly used as sheepwalks, and comprise upwards of 12,000 acres; but the greater portion is now inclosed. Numerous wastes lie between Shrewsbury and Drayton, and the county also contains several extensive moors or bogs, such as Bagley Moors, between Shrewsbury and Eilesmare, where the expense of an efficient system of draining would be more than compensated by the improved quality of the soil.

The Forest of Wyre, on the right bank of the Severn, between Bewdley and Chobmy Mortimer, is a large tract, principally of underwood, which is cut down when young for the purpose of burning into charcoal, which is made somewhat extensively. The county contains a large quantity of oak timber.

The principal river is the SEVERN. The Teme has neither its rise, termination, nor the principal part of its course within the county, yet, being next in size to the Severn, and connected with the drainage of all the southern districts, is second in importance only to that river. It rises in Radnorshire, and soon forms the boundary between that county and Shropshire. It afterwards becomes the boundary between Herefordshire and Shropshire, and subsequently enters the latter a short distance above the town of Ludlow. It then alternately divides it from Worcestershire and Herefordshire, and finally quits the shire and enters Worcester below the town of Tenbury, and falls into the Severn near Worcester. Its direction is nearly east, deflecting below Ludlow to the south-east. The Clun is a tributary of the last mentioned river, and rises within the county in the wild uncultivated district called Clun Forest. The Onny is also a tributary. It rises among the Corndon Hills, and taking a south-east direction, unites with the Teme about 2 miles above Ludlow. The Tern rises in the north-east district, and flows south-west by Market-Drayton. It then takes a course more directly south, and afterwards west, falling into the Severn between

Ateham and Wroxeter. Its whole course is about 30 miles, and it is the longest of the Shropshire streams. The other rivers are the Roden, Perry, Meole Brook, Comd, Camlet, Rae, and the Wolfe, most of which are tributaries of the Severn. The prevailing tendency of the rivers is to the south and south-east. The Severn is the only navigable stream. The fish that frequent that part of it which is in Shropshire are salmon, trout, grayling, pike, perch, shad, chub, gudgeon, roach, dace, carp, and eels. The fish of the other rivers and streams are principally trout and grayling. The lakes, or natural pools of water, are not numerous or extensive. The largest is Ellesmere, near the town of that name. It covers about 116 acres. There are several mineral springs. The canals are confined to that portion of the county which lies north of the Severn. The Birmingham and Liverpool Canal is connected with the Shrewsbury Canal by a branch. The southern part is wholly devoid of water communication.

Shropshire is traversed throughout by railways—Shrewsbury, in the middle of the county, being the great railway centre of this part of the country, whence lines radiate in all directions; whilst Wellington and one or two places on the eastern side of the county, and Claver Amos on the south, are likewise the junctions for several lines. The two main lines are the Great Western and the London and North-western.

Geology.—It has been mentioned that the part of the county lying north and east of the Severn is more even than the south and west.

This marked difference is intimately connected with its geological peculiarities; for the river Severn nearly forms the boundary between the new red sandstone system on the north and the coal formations of the south.

The new red sandstone system occupies the whole northern portion of the county, extending north and east into Cheshire and Staffordshire, and on the west passing into the coal tract, west of Cluck and Oswestry. On the south-west it is separated from the edges of the Silurian rocks of Montgomeryshire, and stretches for some miles south of the Severn to the coal formations about Westbury and Pontesbury, where the sandstone edge of the new red sandstone overlies that of the Silurian, which extends north-east to near Shrewsbury; but the sandstone again penetrates south to a narrow point near the Cleobury Hills, and is succeeded on the west by the old field of Le Botwood. The edge of the rocks of the Silurian system extending north across the Severn, as well as the trap-rocks of the Wrekin, again deflect the sandstone, the boundary line of which is extended still farther to the north-east, from Wellington to a point near Newport, the edge of the formation of Cleobury Dale on whose western side the sandstone again appears and occupies the remainder of the county lying east of the Severn. The new red system in this part of England consists of sandstone, red sandstone and quartzose conglomerate, calcareous conglomerate, and lower red sandstone.

As the new red sandstone system occurs in Shropshire with the exception of a break, it follows that the lower members of the system toward the edges of that system; and accordingly the lower red sandstone is met with along the line which forms its boundary. Bridgnorth is built upon these lower beds, in which bands of impure, greenish-grey, and mottled lime-stone occur, and bear a close resemblance to the cornstone of the Charnock sandstone.

The old red sandstone system occupies a considerable part of the southern division. Another portion of the county, comprising about one-fourth of its surface, is composed of the stratified rocks of the Silurian and Cambrian systems. These occupy the southern division to the west of a line drawn from Ludlow to the Severn at Coalbrook Dale.

The Ludlow rocks rise from the old red sandstone of the Curve Dale into eminences of 1000 or 1100 feet above the

sea, exhibiting the subdivisions of the formation, viz. the Upper Ludlow rock, Aymestry limestone, and Lower Ludlow rock. West of these, and separated by Hope Dale, is that unbroken escarpment extending from the valley of the Onny to Coalbrook Dale, called Wenlock Edge, and composed of Wenlock limestone. This is succeeded by Wenlock shale, in the valley east of the Canadoc Hills, which consists chiefly of different varieties of amorphous trap, flanked on the east and west sides by the Canadoc sandstone. The Ludlow rocks extend into Montgomeryshire, and this formation occupies nearly the whole of that portion of Shropshire lying south and west of the Onny.

The trap-rocks of the Wrekin, as in the other volcanic districts, have disturbed and altered the adjacent strata; and from observing these phenomena, and the dislocations of Coalbrook Dale and the Clew Hills, "it may," says Sir Roderick Murchison, "be affirmed that this district in Shropshire furnishes proofs of the alternate play and repose of volcanic action during very long periods."

Soil and Agriculture.—The soil on the right bank of the Severn is chiefly a red clay and gravel, derived from and overlying the new red sandstone formation; it is favourable for many kinds of agricultural produce. The south-west portion of the county is the least productive. The ground is too steep and elevated, and the soil too light to admit of general cultivation. The valleys consist of loam, resting on gravel, and forming good meadow and pasture land.

Different breeds of cattle are kept, but Herefords prevail. Great care is taken in the selection of the animals, the cattle being required not only for the market but for dairy purposes, and the sheep being valued for their wool as well as their meat. A race of horned sheep, called the "Shropshire Downs," is peculiar to the county.

The meadows adjoining the Severn and other rivers and streams are rich, and are often overflowed, the water lying on them for a considerable time, and embankments have been built, provided with floodgates to regulate the flooding of the adjacent lands.

Mining and Manufactures.—The rich coal formations and the ironstone associated with them give employment to several thousand persons. The greater portion of these are engaged in raising coal, ironstone, and lime, and in the manufacture of iron, and a few in the lead mines on the western side of the county. At Coalport china of every description and of exquisite workmanship is made in large quantities; there is also a manufactory of earthenware, similar to the Etrurian or Wedgwood ware; and in the neighbourhood are very large and important works for the production of Mosaic and encaustic tiles. Flannel manufactories are in operation at Shrewsbury, Oswestry, Church Stretton, and Worthen. Carpets are made at Bridgnorth and gloves at Ludlow, but not so largely as formerly. There are mills for dyeing woollen cloth at Le Botwood, &c., and paper-mills at Ludlow, Cleobury-Mortimer, Drayton, &c.

Shropshire is divided into fifteen hundreds. It is in the dioceses of Hereford, Lichfield, and St. Asaph, and in the Oxford circuit, the assizes being held at Shrewsbury. For parliamentary purposes the county is divided into four divisions, each returning one member.

History and Antiquities.—After the subjugation of Britain by the Romans this county was comprised in the province of Flavia Casariensis. The chief Roman station was *Uriconium*, now *Wroxeter*, the remains of which were lately uncovered and have added considerably to our knowledge of the Roman period in Britain. Under the English it was included in the kingdom of Mercia (that is, the March). Offa, king of Mercia, formed that dyke or rampart which still bears his name, extending from Flintshire on the north to the Bristol Channel on the south. William the Conqueror bestowed this March district upon his relation,

Roger de Montgomery; but it was long before the Welsh princes could be subdued. In order to resist their encroachments a great number of castles were built on the western side of the county. The most important existing in the reign of Henry III. were those of Bridgnorth, Shrewsbury, Ludlow, Ellesmere, Caus, and Oswestry. Of these, Bridgnorth and Shrewsbury were originally Old English fortresses. The ruins of a great number of castles yet remain: those of Ludlow Castle are perhaps the most perfect on the Welsh border. The ecclesiastical and religious establishments of Shropshire formerly amounted to about fifty. The remains of many of them are to be seen at the present day, some in a high state of preservation.

SHROVETIDE seems formerly to have lasted several days, possibly a week, but by the close of the middle ages had dwindled to two days, Collop Monday and Pancake Tuesday, and now the great feasting-time only survives in the modest pancake of Shrove Tuesday. The term Shrovetide alludes to the custom of shiving or confession which generally prevailed, at all events for this once in the year, even with those who did not usually confess, as a preparation for the solemn fast of Lent, which was to begin on the next Wednesday (Ash Wednesday), forty days before Easter Day. But the people from time immemorial prepared their bodies as well as their minds for Lent, and preceded the long fast by a season of gluttonous feasting, still surviving in the carnival time of Italy. The collops of Shrove Monday are slices of salt meat, answering to steaks of fresh meat (eggs and collops are often used in the North as a synonym for eggs and bacon); and collops were formerly the special dish of Shrove Monday, either with eggs or without them. The boys perambulated the place, in the West of England towns, on Shrove Monday, singing a very old traditional shrowing song—

"Shrovetide is nigh at hand,
And I be come a shrowing;
Pray, dame, something—
An apple or a dumpling,
Or a piece of pancake
Of your own make."

Shrove Tuesday, sacred for uncounted centuries to the consumption of pancakes, was in the middle ages also universally celebrated with cock-fights, and throwing at cocks tied to a stake. The reason for this is very obscure. Shrove Tuesday football, for centuries an annual holiday game, is readily understood as a national sport; but cock-fighting does not carry with it any special recommendation. There is certainly an old legend of an attack of the English upon the Danes on Shrove Tuesday, in the dark days of Alfred the Great, being defeated by cocks crowing and giving the alarm, and hence an annual punishment being decreed against the bird; but it seems more probable that the cruelty was in revenge for the cock's share in the denial of his Lord by Peter. Sometimes hens were tied to the stake to be thrown at, instead of cocks. Thus Tusser in the famous "Five Hundred Points of Good Husbandry" says—

"At Shrovetide go shrowing, go thrash the fat hen;
If blindfold can kill her, then give it thy men.
Maid, fritters and pancakes enow see ye make,
Let slut have one pancake for company's sake."

The first pancake was always reserved by custom for the most slovenly maid, and, as a rule, was therefore declined with thanks.

Instead of Shrove-cocks a merciful substitute for the inevitable cudgel-throwing was found in many places in the shape of a scarecrow, called Jack o' Lent. This explains many allusions in old plays and tales, such as "If a boy that is throwing at his Jack o' Lent chance to hit me on the shins," which occurs in Greene's "Tu Quoque," or

"When thou did'st stand six weeks the Jack o' Lent
For boys to hurl three throws a penny at thee,"

which is from Ben Jonson's "Tale of a Tub."

SHRUB. A shrub or bush is a plant with a woody stem which approaches the tree in its duration and consistence, but never attains the height of a tree, and is generally taller than the herb. It differs also from the tree in having the lateral branches so developed as to leave no well-marked main stem. An undershrub is intermediate between a shrub and an herb.

SHRUB, a species of strong, cold punch prepared with spirits, lemon juice, sugar, and water. The spirit chiefly employed in making shrub is rum, and when the word is used in its unqualified form rum-shrub is alluded to.

SHUM'LA (*Shumla*), a town of Bulgaria, situated on the northern declivity of the Balkan, on the road from Constantinople to Bucharest, is 50 miles west from Varna, and 58 S.W. from Silistria, and had 22,921 inhabitants in 1881. Although it is not well built, there are so many mosques and baths that the appearance of the town is agreeable. The mausoleum of Djazur-ul-Hassan Pasha is one of the greatest ornaments. The commerce is considerable; the silk and cloth manufactures are active, the cotton factories, of which there are a great number, supply the neighbouring provinces with the produce of their industry; and the extensive copper and tin-ware foundries and tan-yards enrich the town considerably. Wine and grain are produced in large quantities, and silkworms are extensively reared in the vicinity. The inhabitants consist of Turks, Bulgarians, Greeks, Armenians, and Jews. Being situated at the spot where the roads from the chief fortresses of the Danube to Constantinople meet, Shumla is the key of the Balkan. On three sides it is enclosed by mountains, and previous to the Berlin Congress of 1878 was strongly fortified. It came into the possession of the Turks in 1472. The Russians unsuccessfully besieged it in 1774 and in 1810, but they held it for a short time in 1828.

SI is the syllable used musically to express the Seventh of the major scale, and in those systems where *Do* is synonymous with the note C, *Si* represents the note B. From the famous hymn "Ut queant laxis," &c., used by GUIDO D'AREZZO, only six syllables were selected for use in music: because the system then in vogue was that of HEXACHORD. When this system gave way to that of the octave, a seventh syllable was rendered necessary, and *Si* was invented, it is believed, by Erycius Puteanus, of Dordrecht, at the close of the sixteenth century, by using the initial syllable of the last line of the old hymn (*Sacer Johannes*), but changing *Sa* into *Si* so as not to rhyme with *La*. This, if so, was unfortunate, as giving two syllables beginning with S.

SIALOGOGUES (from Gr. *sialon*, saliva, and *gogos*, that which leads or brings), agents which increase the flow of saliva and other fluids from the parotid and other glands in the vicinity of the mouth. They operate in different ways, and are distinguished into local and remote. Of the local, some are gaseous, others are solid; these last are also termed *Masticatories*. Of the gaseous the most familiar is the odour of savoury food. By the motion of the jaw in the act of mastication a flow of saliva is occasioned, and this result occurs however insipid or insoluble the substance may be which is moved about in the mouth. Hence even a pebble will cause it. But if the substance possess an agreeable aroma or a considerable degree of pungency or acrimony, a greatly augmented secretion is the consequence. In hot climates piquant articles are extensively used to stimulate the languid action of the digestive organs: horse radish, pilostory root, and meadow-sweet have this effect. Remote sialogogues are first received into the system by the stomach or other channels, and then exert a peculiar influence on the salivary glands. Of these the most familiar is mercury.

SIALIS is a genus of insects belonging to the order NEUROPTERA and family Sialidae. *Sialis lutaria* is a

common British insect well known as a bait for anglers. It is about half an inch long, of a brown colour, with strongly veined wings, which, in repose, are laid in the form of a sloping roof on the back. The head is rather large and depressed, and has no ocelli. The perfect insects are dull and sluggish in their movements, and may be found in abundance in spring or summer in the neighbourhood of water or attached to water plants. The eggs are attached to water plants, and from them are hatched curious looking larvae, having a long body, a large horny head furnished with powerful jaws, and the segments of the abdomen furnished with jointed bristles, which serve as gills, and also assist in swimming; at the extremity of the abdomen is a long bristly tail. When full grown the larva forms a burrow in the bank, and there changes into the pupa, which is inactive.

SIAM. Including the countries tributary to or dependent on it, Siam comprehends a vast extent of country in the peninsula beyond the Ganges and the larger part of the Malay peninsula. On the east of Siam lies Cochin-China or Annam; on the north is Burma and Laos; on the west is Burma, Pegu, and Tenasserim; and on the south is the Gulf of Siam and the Malay peninsula. The area is difficult to estimate, but is probably 250,000 square miles.

A portion of Siam is covered with mountains and hills, which are connected with two chains running into China. North of 22° 30' lies, and without the boundary, both ranges approach so near to one another as to constitute one extensive mountain region; but after entering Siam the heights gradually recede, and contain the wide valley of the Menam River.

Coast Line.—The coast which extends for 1200 miles, is bounded by a strait of from 10 to 20 miles, with a series of islands. The channel between them and the mainland has depth enough for the largest vessels. The islands are rocky, and most of them of some rising to more than 3000 feet. Most of them are only from 2 to 6 miles long. The largest, from north to south, are the following: St. Matthews at 10° N. lat., also called Elephant Island, is about 18 miles long and 6 wide, and has in its north part an excellent harbour; Salabat, or Junk Seylon (8° N. lat.), is about 20 miles long and 10 wide, and on its east side are some tolerably good harbours; it contains extensive tin mines, the produce of which with cable birds' nests, ivory, and Japan wood, are exported chiefly to the British settlements in the Strait of Malacca. Further south, between 6° 19' and 6° 8' N. lat., is the group of the Lankas, which in relation to several smaller ones, contains the islands of Pooto, Pucaw, and the two Indras; they also have some good harbours. The eastern coast is much lower than the western, and the mountains are frequently 15 or 20 miles distant. In fertility it is also superior; several extensive tracts yield rich crops of rice, and others, well cultivated and covered with jungle, exhibit a vigorous vegetation. The islands along this coast are little cultivated and are devoted.

Hydrography.—The Salween, which for some distance forms the boundary between Siam and Burma, is noticed under Burma. But the most important river is the Menam, or Mother of waters, which rises in the south-western districts of the Chinese province of Yunnan. It is in reality formed of two branches. The western and longer one, called Nantung ho, has its origin near 24° N. lat., and has a general southward course until it joins (south of 22° N. lat.) the other branch, called Ma-paen, which is considered by the Siamese to be the principal one, though its course is not so long. The united river passes by the old and new capitals, Ayuthia and Bangkok, and enters the sea by three branches, 18 miles in a direct line from Bangkok, but, on account of its windings, really 30 miles distant. The easternmost of its three mouths is navigable for large ships, though all are more or less obstructed by

bars. The total course of the river is estimated at 550 miles. The adjacent country is overflowed by the Menam from August to December. In fact, this river is as important to Siam as the Nile is to Egypt, the rice crop depending entirely on its annual inundation and the amount of fertilizing matter brought down in its course. The valley through which it flows is of almost unsurpassed fertility; and the extent of country under the direct influence of the inundations is about 12,000 square miles, but the total area drained by the Menam is nearly 22,000 square miles. Of its affluents, the two best known are the Mekhleng and the Phitsalok. About 30 miles east from the eastern mouth of the Menam is that of the river Bangpa-kung, which is of considerable size and nearly 300 miles in length. Another important river, which flows from Burma through a portion of the east of Siam into Cochin-China, is the Meikong. There are several extensive lakes in different parts of the country.

Climate and Products.—The climate varies with the latitude and the elevation of its surface; but, as in other tropical countries, it has two seasons—the wet and the dry; the former beginning in April or May, and continuing till about the commencement of July, when the dry season sets in and lasts till the following April or May. The average temperature at Bangkok is—Cool season (November to February), 77° Fahr.; hot (March to May), 85°; wet (June to October), 84°. Mean of the year 82°. The mean range of the thermometer is 13°; it seldom sinks lower than 72° Fahr. On the whole the country is healthy. Ague and cholera are the diseases most rife, and they are very prevalent in the marshes during the wet season. The Gulf of Siam is exempt from hurricanes, so that shipwrecks are very rare. The kingdom is rich in natural productions, of which rice is the chief. Before the treaty with Great Britain in 1855, merely enough was grown for home consumption; but since that a large export trade has sprung up. The land on which the seed is sown belongs to the king. There is no system of irrigation, the natives trusting entirely to the rains or the overflowing of the rivers for the necessary moisture. Droughts occur on an average once in twelve years. Agriculture altogether is in a very rude and backward state, but a better system is being gradually introduced. Maize, several leguminous plants, sweet potatoes, cocoa, and areca palms are cultivated. The country is noted for a great variety and abundance of fruit trees, and their produce surpasses that of all parts of India in flavour. Several plants are cultivated as articles of foreign trade. The most important, after rice, is the sugarcane, which indeed has been grown in Siam from time immemorial, but its production has been decreasing for many years past, in consequence of the heavy taxation to which it is subjected. Tobacco, cotton, and black pepper are also exported. The forests, which cover nearly all the mountain ranges, yield several articles of trade; among which are cardamoms, gamboge, aquila-wood (renowned for its perfume, and on that account extensively used at marriages, funerals, and other ceremonies in Eastern Asia), and a great variety of timber trees, including teak. Silk culture is carried on in the province of Kabin, which lies on the eastern side of the Siamese delta, at the foot of the mountains separating the Menam valley from that of the Megong. Considering the natural wealth of the country there is comparatively little trade and industry, mainly owing to the state of serfdom in which the population is kept, chiefly through the custom by which a debtor becomes the slave of his creditor. Throughout the whole of Siam the natives are liable to forced labour for a certain period of the year, varying from one to three months, in consequence of which the land, rich in many parts, is badly cultivated. Probably not more than one-twentieth of the available land is under cultivation. Domestic slavery is in partial process of abolition. Nearly the whole of the trade

is in the hands of foreigners, and in recent years many Chinese, not subject like the natives to forced labour, have settled in the country.

Natural History, &c.—In Siam the elephant exists in the greatest perfection, and is much employed as a beast of burden. The ivory, hides, and bones are largely exported to China; but it is against the law to kill the animals, as they are considered the property of the king. The breeding of elephants is carried on very extensively. Black and wild cattle and buffaloes are numerous. Tigers, tiger cats, bears, leopards, rhinoceroses, elks, and many kinds of deer are found in the woods. The horses of Siam are small, resembling our ponies. A kind of goat is kept about the temples. Hogs are numerous, both in a domestic and in a wild state. The lard, prepared with great care, is exported to the European settlements in the neighbouring countries. Wild fowl exists in the forests, and the common fowl is reared in the lower countries. Fish and turtle are very abundant; and crocodiles, lizards, and serpents of various kinds infest the country.

Gold is found in the mountains, and is worked in some spots. Tin, iron, copper, lead, zinc, and antimony are met with in many places, and are extensively worked by the Chinese. The precious stones are the sapphire, Oriental ruby, and topaz. Salt is made in the low wooded country which extends between the mouths of the Menam along the sea.

Population, Manners, &c.—The population is rather imperfectly known, and the difficulty of any correct result is the greater owing to the Oriental custom of numbering only the men. The last native registers state the male population as follows: 2,000,000 Siamese, 1,000,000 Chinese, 1,000,000 Laotians, 1,000,000 Malays, 350,000 Cambodians, and 50,000 Peguans. Doubling these figures to include the female sex gives a total population for the kingdom of 10,800,000 inhabitants.

The people are of the Mongolian family, shorter than the Chinese and taller than the Malays, and have the same social habits as the Chinese when the latter are uncontaminated by European influences, being honest and peaceable, but idle, passionless, and timid. The Laos of the interior differ from the Siamese proper in being more slender and darker in complexion; they are intrepid hunters, and live in tribes under a patriarchal government. The women perform most of the labours of the field, work the boats on the river, act as porters, &c., and are extensively employed as retail traders. Those of the higher classes spend their time in idleness and sleep. Social respect is demonstrated in the most extravagant manner. No inferior stands in the presence of a superior. Even younger brothers kneel in addressing the elder or when landing him anything requested, and subjects of the highest grade approach the sovereign on hands and knees. The people are very fond of jewelry and ornaments, and are proficient in music, having several good native instruments, as well as those in general use in Europe. Cock-fighting is a favourite sport, and kite-flying is the amusement of young and old.

European influences are rapidly working changes among the people—as regards their morals, it is said, not entirely in the direction of improvement—and the troops are being trained in the western manner, roads, telegraphs, and canals constructed, ships built, steamers introduced, science and commerce encouraged, and printing from types, before unknown to the Siamese, has been established. Court astrologers and prognosticators are maintained with small annual stipends, who in former reigns received a sound castigation upon the failure of their predictions. By the crudest methods these astronomers-royal calculate the movements of the sun and moon and eclipses. The most general faith is BUDDHISM, but there is complete toleration

Language.—The Siamese language is very simple in its construction. The alphabet consists of thirty-six consonants and twelve vowels; and the written characters, like the Burmese and Peguan, resemble the Pali and Sanskrit. The roots are few in number—all monosyllabic, and there are no terminations to indicate gender, number, person, mood, or tense. Although as yet no inter-connection has been traced between the languages of Burma, Cochinchina, and Siam, or between these and the Chinese, yet the fact that all these races of South-east Asia have tongues of the same structure (or want of structure) gives strong presumption of some relationship existing between them. At all events there must exist some reason why these three languages (and one or two others of the same region) are arrested at precisely the same stage of development, while the Chinese, though quite as completely monosyllabic as themselves, has made large advances in capacity of expression and flexibility. The Siamese literature is meagre and uninteresting, consisting of songs, romances, and a few chronicles. Although theatrical representations are very common with the Siamese, they have no written dramas nor any history beyond the dry chronologies of their kings. Education is very backward; few can do more than read and write awkwardly, and perhaps cast accounts.

Music.—The finest possible opportunity for the examination of Siamese music occurred in 1885, when the King of Siam was induced to permit his court band with their instruments to appear at the International Inventions and Music Exhibition held in London that year. The instruments were all played with the performers sitting cross-legged on the ground, and consisted of wood, brass, and steel harmonicons (*camat*), kettle-shaped gongs (*ka-nong*), arranged in beautiful frames in a circle, in the midst of which the performers sat, three-stringed violins (*ae'chai*), two-stringed fiddles (*sar-chuei*), three-stringed crocodiles (*tak'hai*), reed pipes, flutes blown vertically at a sharp edge, not transversely at the edge of a hole as with us, drums, and tom-toms. These instruments possessed a scale which was intended to be made of seven equally divided intervals in the octave. Using the notation of cents invented by Mr. A. J. Ellis, where the octave contains 1200 cents and each equal semitone = 100 cents, this Siamese scale would have 171·43 cents to each interval. The theoretical scale was therefore as follows:—

0 171 343 514 686 857 1029 1200

and to our ears gave a flat Second (200 with us), a flat Third (400 with us), a slightly sharp Fourth (500), and a slightly flat Fifth (700), a flat Sixth (900), and a very flat Seventh (1100). The general effect was that of a scale frightfully out of tune, and with a flat Seventh. The performers, with great politeness, often gave English airs, and generally terminated their concerts with "God save the Queen," so that it was easy to test the effect of the scale on familiar melodies.



The *d'* in this example would lie almost exactly at three-quarters of the interval between *d* and *d'*, or, as we might say, "a quarter of a flat" beneath *d*, and the *b* would be about as much too sharp, say "three-quarters of a flat" beneath *b*. This flat Seventh was by far the most noticeable difference; the ear got used to the other parts of the scale after several hearings, but it never tolerated the absence of a "leading note." It was of course to be expected, as indeed careful experiments showed to be the fact, that the actual tuning of the instruments was not quite so regular as the theory desired.

All the instruments were most exquisitely made, and the execution of the musicians was marvellous. Time was

kept by the conductor with a pair of tiny cymbals. It was invariably duple, and he marked the strong accent by a clanging contact, the weak accent by a closed or dull contact, the bell-like tone of the strong beat being faint and sweet, and though always traceable if we listened for it, yet never interfering with the music. Great effects of light and shade were produced, and most rapid variations were played; the time and accent were invariably faultless. Melody was clearly pronounced, but there was no harmony. The object of having various instruments was simply to vary the colour of the tone, and this was very skillfully done. All pieces were played by memory, and the repertoire was considerable.

The harmonicons were tuned by metal weights imbedded in wax and stuck on beneath the bars: their lowest note gave 325 vibrations to the second (about our f''), and the compass was two and a half octaves.

The crocodile was a very curious instrument, and is almost identical with the Burmese *myingmying*, of which there are examples at the South Kensington Museum in London. The imitation of the crocodile's form is not so pronounced in the Siamese instruments, which are beautifully decorated with inlaid ivory. The long body is a hollow cylinder, 4 feet long, $6\frac{1}{4}$ inches in height, and about twice that in breadth. The sound-hole is a long slit lengthwise. The three strings are of silk, and rest on two bridges widely separated. The tuning pegs, of ivory, are 8 inches long, and are situated in the "tail" of the crocodile. There are ten frets of hard wood, over which the strings run, and the performers press the strings between the frets, giving great power of variation over the patch of any single tone. The strings are set in vibration by a conical ivory plectrum, moved lengthwise with an extremely rapid vibration.

Government, Trade, &c.—The form of government of Siam is feudal in character, and similar to that of Japan before 1868. The political power rests with a number of hereditary chieftains, owners of land, while the general legislative and executive authority is vested in two kings, the first of whom is the real occupant of the throne. In recent times the two dignities have been frequently filled by father and son. Under the two kings is a supreme council of ministers, taking the different departments of government, and the forty-one provinces into which the country is divided are each presided over by a governor.

The king's revenue may be estimated at about £2,000,000 a year, of which sum the land-tax produces £287,000; tax on fruit trees, £65,000; spirits, £100,000; opium, £120,000; gambling, £100,000; customs, £120,000; tin mines, £90,000; edible birds' nests, £27,000, fisheries, £27,000. All the taxes, with the exception of the customs duties, are farmed. There is no public debt, and paper money has not been introduced. The expenditure is stated to keep up with the receipts.

There is a small standing army, and a general armament of the people in the form of a militia. Every male inhabitant from the age of twenty-one upwards, is obliged to serve the state for three months a year, exemptions being however made in favour of priests, public functionaries, slaves and those who can pay a fine as substitute money, and in addition find as a substitute some person not liable to the conscription. The government possesses about 80,000 stand of arms, and a great stock of cannon. The fleet of war consists of four steam corvettes and twelve gunboats, officered by Europeans, chiefly Englishmen.

The most important industrial occupations are iron-founding, tin smelting, gold beating, and the making of cloth, glass, and pottery. Vases, urns, and other vessels, in the manufacture of which gold is embedded, or silver in a manner somewhat resembling that for which the Russians are celebrated, are also made in great numbers and sent to all parts of Asia.

Although Bangkok was formerly one of the most important commercial cities of the East, bad legislation and monopoly had reduced the foreign trade almost to nothing until 1855, when Sir John Bowring negotiated a treaty of friendship and commerce with the king, by which British subjects and other foreigners were allowed to trade freely in all the ports of the country, and to purchase lands, houses, &c. All monopolies were annulled, and liberty was given to the foreign merchant to purchase and sell his goods direct, without the intervention of a third party. The commerce has since very materially increased. The value of the total exports from Bangkok in 1885 was £1,572,788, the staple article of export being rice to Hong Kong and Singapore. The minor exports embraced a great variety of articles, chief among them hides, sesame, pepper, sapan-wood, spices, ivory, cattle, horns, and teak. The total imports into Bangkok, in the year 1885, were of the value of £1,138,338, the imports comprising mainly textile goods, hardware, and opium. Under a treaty ratified in the beginning of 1883, a British vice-consulate was established at Chienmai, the most important city of Northern Siam, and all suits arising between British subjects and Siamese in that part of the country are tried there.

The chief towns are the ancient and modern capitals—Ayuthia and BANGKOK.

History.—Siam is called by its inhabitants Thai, or Muang-Thai, meaning "free" or "the kingdom of the free." The word Siam—quite unknown to the natives—is probably identical with Shan, applied in Burma to the Lao race. The early annals of Siam are fabulous. In 1511 the Portuguese, after the conquest of Malacca by Albuquerque, established an intercourse with the country. In the sixteenth century it was for many years subject to the Burmans, but recovered its independence towards the close of it. In 1612 the first English vessel went to Ayuthia, but no commercial relations were established with the British government until 1685, when the Siamese envoys to Louis XIV. of France visited London, and concluded a treaty with Charles II. Very little intercourse, however, took place between the two nations until the conclusion of the treaty in 1855 by Sir John Bowring, already alluded to. In the early part of the eighteenth century a civil war desolated Siam, and in this state of things the Burman sovereign Alompra meditated the conquest of the country. He was prevented from the execution of this design by his death in 1760; but one of his successors prosecuted his plan, and took the then capital, Ayuthia. The King of Siam was killed in the assault, and his family were carried away to Ava as prisoners. Soon afterwards the Burman army left the country, and a chief of Chinese descent seized upon the throne and proclaimed himself king; but he was put down in 1782, since which date neither Chinese nor Burmans have had power over Siam.

SIAMANG (*Hylobates Syndactylus*) is a species of Gibbon, remarkable in that in some points of its structure it approaches the human type more nearly than any other ape. It is a large powerful animal, covered, except on the belly and neck, with long coarse glossy black hair. The head is small, the neck long, and the arms very long, the fingers reaching to the ground when the animal is in an erect position. The first and second toes of the feet are united by a fold of skin nearly to the end; in spite of this the bones of the foot, as well as those of the hand, resemble the human more closely than those of any other ape; the breast-bone, scapula, and ribs also present human resemblance. It has a large laryngeal pouch. The siamang inhabits the forests of Sumatra and the Malay Peninsula. It moves along very fast among the trees by swinging itself with its long arms. On the ground it can walk in an erect position fairly well. Its food consists chiefly of fruits and leaves. It is a quiet inoffensive animal, and in several cases has made a very affectionate pet.

SIAMESE TWINS, the name given to two persons, Chang and Eng, who were formerly objects of great curiosity from the circumstance that, though possessing each a distinct individuality, they were bound together by a short cartilaginous band at the pit of the stomach, so that they could not be separated. They were born in 1811, and were found at Meklong, in Siam, by an American, Mr. Robert Hunter, by whom, in 1829, they were taken to New York, and publicly exhibited. They were afterwards brought to Europe, where they remained for several years, but ultimately settled on a farm in America, and married two sisters. In 1869 they once more visited Europe, having lost all their fortune through the American Civil War. Their death took place in America on 16th and 17th January, 1874, one brother surviving the other by about two hours.

SIBERIA (so called from *Sibir*, on the Irish, once the capital of a little Tartar state) is the heading under which, excluding Transcaucasia [see **RUSSIA**], the Asiatic portion of the Russian Empire may be conveniently described. This region, comprising Siberia and Central Asia (or the more modern conquests of Russia in Asia), extends about 4000 miles from east to west, about 2000 from north to south, and covers over 6,000,000 square miles. The northern boundary is the Arctic Ocean; the eastern the seas of Kamchatka, Okhotsk, and Japan; the southern the Chinese Empire, the Hindu-Kush range, Afghanistan, and Persia; and the western the Caspian, the Ural River, and the Ural Mountains.

Siberia embraces the whole northern part of the continent, extending from Afghanistan and the Chinese Empire on the south to the Arctic Ocean on the north, and from the chain of the Urals on the west to the coast of the Pacific on the east—the total area thus exceeding the entire surface of Europe. But the population is comparatively very inconsiderable, numbering only about 4,000,000, or less than one to the square mile. On the western side a portion of the country is included in the European governments of Perm and Orenburg. From the Chinese dominions the general southern boundary is defined eastward by the river Amur, and westward by the Altai Mountains. This chain, or rather series of ranges, though of moderate elevation generally, rises above the line of perpetual snow in Mount Bielukha, which attains the height of 11,000 feet. Lowland plains, declining very gradually from south to north, or towards the Arctic Ocean, occupy an immense proportion of the surface. Some are clothed with dense forests of pine, aspen, larch, and birch. Others, in the west and south-west, are true steppes, with no vegetation for hundreds of miles except a few bushes, willows, and saline plants, but plentifully besprinkled with salt lakes and marshes. The whole northern zone consists of the mossy, rush-grown levels called *tundras*, swampy in summer, hard bound with ice and snow in winter, which have been styled “the types of everlasting rest,” from the invariable sameness of their seasonal features, and the impossibility of altering them by introducing cultivation. Yet, melancholy as this land is, towards its inner border there are numerous little valleys, which have been described by Seeborn as “complete gardens of the most brilliant wild flowers, swarming with birds by thousands and tens of thousands, enjoying during the summer season a perpetual day.” In the eastern portion of the country there is greater superficial diversity. Ranges of mountains occur, which are finely clothed with woods in the southerly districts and inclose fertile valleys. These features are especially characteristic of the region of the Baikal and the Amur. The country is generally considered as divided into Western and Eastern Siberia by the Yenisei River.

Western Siberia, seen from the slopes of the Ural range, seems to stretch to the east in a limitless plain imperceptibly rising from the Arctic Ocean to the Kirghiz Steppes

and the foot of the Altai, the gold mountains, which spring up from it like a wall, forming the northern buttress of the great table-land of Central Asia. The northern portion of this plain is occupied by tundras, bogs resting upon a frozen subsoil; its central portion consists of vast primeval forests, with a fertile soil, well adapted to agriculture; while in the extreme south we reach the treeless steppes, which extend beyond its political boundaries as far as Lake Aral and the Syr Darya.

Eastern Siberia comprehends the river-valley of the Lena and Kolyma, the expanse of Lake Baikal, great part of the basin of the Amur, and a vast maritime tract on the Pacific Ocean. The country is mountainous in many parts. It comprises the eastern portion of the Altai series, with the chain of Saian, and the Jablonovy or Apple range towards the southern border, while parallel generally to the east coast the Stanovoi Mountains stretch northward to the shore of Behring Straits. Forests of gloomy pines largely clothe the central portions of the surface. Other trees prominently mingle with them southerly, especially in the direction of the Amur, or the “Great River,” as the Tunguses call it, while their Mantchu neighbours apply the name of Sagalientula, “River of the Black Water,” to the stream. This is the most naturally fertile part of the vast province, but it has only become Russian by cession from the Chinese at a comparatively recent date, and is therefore very little colonized. Northward, with every advance, the general aspect of the country becomes increasingly cheerless and desolate, while subject to a winter cold terrible in its rigour and long duration. Thousands of square miles of this area are very imperfectly known to the authorities, and are not worth exploration, except by the fur-hunter. The most remarkable district is the extensive volcanic peninsula of Kamchatka. The northern members of the Kurile Isles, which stretch out from this peninsula towards Japan, with Saghalien Island, off the mouth of the Amur, Wrangel Land, discovered in 1819 by Kellet on the spot previously indicated by Wrangel, and for the first time circumnavigated in the summer of 1881, and the singular ivory-bearing Lixoe group, opposite to the mouth of the Lena, are included in this division of Siberia.

The great feature of the climate in Northern Siberia is the purga, a hurricane of hard, driving snow dust, closing the eyes, stopping the breath, and forcing its way through the dress; while the force of the wind overturns man and the reindeer, and the traveller must stop and sit in his sledge till the storm is over. These storms seldom last less than twenty-four hours, and often continue for three, six, or even twelve days, with occasional intermissions. They occur in the autumn and spring, not in winter, when the weather is, for the most part, calm.

Climate.—Though during the short summer the heat is great, Siberia, taken altogether, is the coldest country in the northern hemisphere, if we except Greenland and the Arctic Archipelago of North America. It is much colder than any part of Europe situated in the same latitude. At the mouth of the river Yana, in 70° 55' N. lat. the mean annual temperature is as low as 4° or 5° Fahr. The climate increases in severity as we proceed from west to east. So intense is the cold in Eastern Siberia that quicksilver freezes every winter in the country near Irkutsk, and in Yakutsk it remains in a frozen state for two months together in mild seasons, and in severe ones for three months. In a large part of the country the ground is frozen to a considerable depth, even at the end of the summer. The fact of the temperature of Western being higher than that of Eastern Siberia, is partly explained by the contiguity of the great Caspian Desert, which in summer is extremely hot.

Rivers.—Siberia has a great number of rivers, and as the whole course of most of them, and the greatest part of that of the remainder, lies through a level country, their

currents are slow, and nearly all are navigable for a considerable distance. The principal streams run from south to north, from the agricultural districts to those where vegetation does not supply food to the inhabitants, and hence their great importance for internal intercourse. The tributaries, at least the greater number and the largest of them, flow chiefly east and west, and form a water-communication between the agricultural districts themselves; and from the river Ural to Yakutsk, a distance of 6000 miles, the magnificent water way is broken only by two short portages between the Obi and Yenisei, and between the Yenisei and Lena respectively. The whole country is in this way covered with a network of rivers, affording altogether some 30,000 miles of navigable waters. Of the four great rivers of Siberia, three, viz. the Obi, the Yenisei, and the Lena, enter the Arctic Ocean; the fourth, the Amur, flows south into the Pacific. Unfortunately they are all ice-bound during the greater part of the year. The Lena freezes at the end of September, and only opens in May; the Obi remains covered with ice from the end of October to the end of April; the mouth of the Amur is closed by ice from the middle of November to the beginning of June.

The basin of the Obi, Obo, or Ob is said to comprehend more than 1,370,000 square miles. The stream rises in the Altai Mountains with two large branches, the Katunga and the Irtys, which collect the waters from an immense area of that mountain region. After the junction, near the town of Khatansk, the Obi flows successively west, north, north-west, and west to its junction with the Irtysh, receiving in its course the Chirchik, Irtys, Choolym, and the Ket, perhaps its most important tributary, as it is navigable for more than 600 miles to the Yenisei, with which it is now proposed to connect it by a canal 2½ miles long. The Irtysh rises in the Chinese Empire, about 46° N. lat., 87° E. long, and has a generally north-western course of nearly 2000 miles, until it meets the Obi itself, receiving the waters of the Buchtuma, the Om near Omsk, the Tobol at Tobolsk, the Ishim, and other rivers. The Obi, after its confluence with the Irtysh (about 61° N. lat., 68° E. long.), flows northward and flows in that direction to the vicinity of the polar circle, when, increasing to a great width, it turns east and falls into the Gulf of Obi by three arms. This gulf is between 70 and 80 miles wide and more than 400 miles long. The Obi supplies a larger quantity of fish than any other river in the world. Its entire length is about 2000 miles.

The Yenisei, whose basin covers an area of over 1,000,000 square miles, lies between the Obi and the Lena. Its two remotest branches, the Tura and Angara, originate in the Chinese Empire, among the lofty Altai Mountains, each being formed by the confluence of numerous smaller rivers. The latter is the more important of the two; it flows 170 miles through the Chinese Empire, 250 more to Lake Baikal, and then into the plains of Siberia, where it forms the Yenisei by a junction with the Tura, in 58° N. lat., 90° W. long. The Yenisei, after this junction, runs north-west to 60° N. lat., then north to 69°, and again north-west to 72°. Before it reaches 73° N. lat., it enlarges into a wide estuary, called the Gulf of Yenisei, which is full of low islands and shoals and is on an average 20 miles wide and more than 200 miles long. The mouth of the Yenisei is 200 miles east of the Gulf of Obi, and its total length, with the Angara, is about 5000 miles. It is of great breadth, and near the ocean from 2 to 8 fathoms deep. In 1863 the first steamer on the river made a successful voyage up and down with heavy cargoes. The country between the Yenisei and the Angara is the richest gold-washing tract in Asiatic Russia.

The Lena ("Shuggard"), whose basin is estimated at 1,000,000 square miles, rises in the Baikal Mountains, less than 20 miles from Lake Baikal, and about

50 miles north-east of Irkutsk. It flows past Kotshuga, Olekminsk, and Yakutsk, its course generally being to the north-east: 800 miles from the Arctic Ocean it is 5 or 6 miles in width; and at its mouth forms a delta, traversed by several arms of the river, three of which are navigable channels. Among the tributaries of the Lena are some very large rivers, the Vitima, the Olekma, the Aldan, and the Vilui. The length of the Lena is about 2500 miles. It is entirely within the Russian dominions, and is generally navigable with safety, but in a great part of its course flows through a frozen desert.

Besides these great rivers, there are some of less magnitude, but still so large that they would be considered important in any other country. The Amur and the ANADYR are noticed in separate articles.

The only important lakes are those of Baikal, in the government of Irkutsk, and Balkash-Nor or Tengheez, chiefly in the south of the government of Tomsk, but partly within the Chinese frontiers.

Mountains.—The Altai are exceedingly rich in metaliferous ores. The eastern prolongation, the Sayan Mountains, attains a height of 11,450 feet, in the Munku-Sadyk, at the northern end of Lake Kossogol. Beyond the river Selenga, near which is Kiakhla (2330 feet), on the Russo-Chinese frontier, the Yablonovoi, Yablonoi, and the Stanovoi Mountains stretch in a north-easterly direction as far as East Cape, forming the watershed between the Arctic and Pacific Oceans. The hilly region extending along the northern foot of these mountains, is in many parts exceedingly fertile; but in the north passes into irregular tablelands of moderate elevation, which extend in several places to the shores of the Arctic Ocean, and are the home of tribes of hunters and fishermen. Kametchatka, the most important peninsula of Siberia, is traversed by a range of volcanic mountains, culminating in the volcano Klyuchef (15,800 feet). The regions of the Amur, in the south-east, are for the most part mountainous and densely wooded, but there are also extensive prairies and fertile mountain valleys.

Productions, &c.—South of 61° N. lat. in West, and 61° N. in East Siberia, the more hardy cereals and vegetables (barley, oats, rye, and turnips) are cultivated, and in some favourable localities small quantities of wheat are also grown. In the milder regions a few fruit trees, such as the gooseberry and cherry, also thrive. The domestic animals consist of camels, sheep (with fine wool and broad thick tails), horses of good quality, an inferior kind of cattle of the Russian breed, and a large species of dog, used in drawing the sledges. Swans, geese, ducks, and game are very plentiful in the south, and fish abound in the rivers and on the coast, especially on the east, where the seas are frequented by whales and other cetaceous animals. The reindeer, the arctic or black fox, the white bear, wolf, lynx, wild boar, glutton, sable, ermine, marmot, marten, squirrel, Caspian antelope, and wild sheep inhabit various parts of the country; but many of these animals, which are so much valued for their fur and skins, are rapidly becoming very scarce, in consequence of the exterminating warfare of the hunter. Tribute-furs, for the emperor, are exacted from the native tribes as an acknowledgment of allegiance. The camel is found as far north as 50 degrees, and the reindeer descends as far south; so that in the south of Siberia these animals are seen together, though for the most part they belong, the one to very hot countries, and the other to intensely cold ones.

There are three extensive mining divisions. The most western comprehends the Ural Mountains. These are rich in gold, silver, and copper; and they also contain iron and platinum in smaller quantities. The second district yields much silver and copper, but less gold and lead. The mines lie mostly in the Altai Mountains and in those valleys which open to the Irtysh River. The third mining country

is situated in the basin of the river Amur. The mines there contain gold, mercury, lead, silver, iron, antimony, tin, zinc, plumbago, and arsenic. Salt is found in natural crystals on the banks of several lakes.

Several kinds of precious stones also occur in Siberia, and diamonds have been found along the eastern declivity of the Uralian range. The amethysts, topazes, emeralds, jaspers, porphyries, and red tourmalines, are of great beauty; and zircons of extraordinary size have been found near Mask, south of Ekaterinburg. Lapis-lazuli and tale of fine quality are met with. All precious stones, wherever found, are the property of the emperor, and the government also has a monopoly of the gold washings.

The tusks of the fossil elephant constitute an article of commerce, and many persons make the discovery of them the business of their life. The fossil bones are deposited in immense masses, which occur more frequently and are of larger extent in proceeding from south to north. They are generally found at a certain depth, mostly in hills of clay, rarely in mould, and never in sand. In addition to the skeletons of these extinct mammals, there have been discovered entire bodies with flesh and skin quite complete, and having a very thick covering of hair.

Inhabitants.—The native tribes of Western Siberia consist of Samoides in the extreme north, who are thinly sprinkled on the shores of the Arctic Ocean, and belong to the same family as the Finns of Europe. They subsist chiefly by fishing, are an extremely ignorant and degraded race, addicted to forms of the grossest heathenism. South of these, spread over a wide area, are Ostiaks and Voguls, fishers and hunters, who probably belong to the same stock, and are only to a slight extent more advanced. Some have been made by baptism members of the Russo-Greek Church; others profess a mongrel kind of Mohammedanism; but the oldest superstitions are prevalent respecting the power of evil spirits, the effect of charms and magical incantations, while the bear is occasionally honoured with propitiatory rites before the hunter will go out into the woods upon an expedition to destroy him. The Russians, however, or their descendants, who have spread out especially over the plains of South-western Siberia from Central European Russia towards Lake Baikal, and down the banks of the four great rivers towards the Arctic Sea and the Pacific, now form by far the largest proportion of the inhabitants of Siberia, and far exceed those of purely Asiatic origin. These "Siberiaks," or people who have Russian or Polish blood in their veins, have fair hair and broad faces and prominent cheek-bones, and are a frugal, energetic, and hospitable people, though cunning and addicted to strong drinks. They are for the most part the descendants of exiles, of whom for many years from 12,000 to 15,000 were annually sent to Siberia for political or other offences. The principal place of banishment for Russian offenders is now the far distant island of Sagalien in the Sea of Okhotsk. As to the crimes of the exiles, they are not all political, or even chiefly so. A large proportion are sent there because they have rendered themselves obnoxious to the community among which they lived. A man is sent by his commune to Siberia if he is idle and drunken and will not pay his taxes or support his family, and in Siberia he gets his living as a colonist.

With regard to the fate of these exiles, nothing can be more astonishing than the change that has been wrought in Russian minds with respect to the ominous name of Siberia. That region, which imagination has invested with all the terrors of a place of expiation and torture, turns out now, in sober reality, to be rather an Eldorado. Not only is there no limit to its mineral wealth, but large tracts of its soil, in spite of the climate, give evidence of prodigious fertility, and offer a wide field for the energies of colonizing enterprise. The ill-treatment of transported convicts, the Russians contend, is an affair of the past. Indeed, they

affect to look upon it as a myth, a bugbear, the gloomy reports of which vanish upon the application of impartial critical inquiry. But, whatever may have been the fate of the worst criminals and political offenders in olden times, the condition of a prisoner at the present day, the Russians say, if he will only work, ought to appear not unenviable; for he is not only well-fed and lodged and cared for, but is even free to choose and change his abode, to pursue the occupation he prefers, to earn money and make his fortune while he rehabilitates his character. So great is well-being appears to be, say the Russians, that crowds of free and voluntary emigrants follow in his track. Siberia and Central Asia are to Russia what Australia and Van Diemen's Land were to England, with this difference, that the English penal colonies were at enormous distances beyond sea; Russia's Asiatic possessions are integral parts of her territory, and can be occupied and tinned to the purposes of civilization step by step and stage by stage, trade following on the settler's path and railways annihilating distance. Still for all that may be said, the arbitrary method of inflicting the punishment and the absence of control in carrying it out leave room for cruelty and abuse, which must frequently be taken advantage of, and those even who take the most favourable view, mention circumstances that few would deny are a disgrace to civilization.

The aborigines of Eastern Siberia belong to various tribes, like those of the western division, and correspond to them in modes of subsistence, wandering habits, paucity of numbers, gross ignorance, and low social condition. Though generally following fishing and the chase yet many possess large herds of reindeer, and lead a more settled life. The Burats, dwelling round Lake Baikal are of Mongol origin, and are said to be the most numerous, though only reckoned at 1,00,000. They adhere to forms of Buddhism, as do the Tunguses, who are spread over the country eastward of the Lena, blending with them rites analogous to fire worship. Some of the Yakuts in the lower part of the Lena valley, and the Kamchadals in their peninsula, have nominally embraced Christianity, but retain old superstitions, and cling to ancestral deities in all their rudeness. The Tchukchi, who occupy the extreme north-eastern angle of the continent, are pagans, bold and warlike, completely independent of Russian control. They occasionally visit the post of Anadyrsk for the purpose of barter, but all attempts to subdue them and occupy the country beyond this station have hitherto been repulsed with loss. The name of these people is said to signify a confederation or brotherhood. But until Nordenskiöld in the course of his celebrated North-east Passage expedition in 1878, was ice-bound for some months off their coast, really less was known respecting them than of almost any other race on the face of the globe, considering that Behring communicated with them nearly a century and a half ago, and Cook touched on the coast.

The great trade route, and the line along which the chief towns of Siberia lie, is that which passes from the frontier of Mongolia at the trading depot of Fackta, through Irkutsk, Krasnoyarsk, Tomsk, and Tara, to Ekaterinburg, at the main passage of the Urals into European Russia. There is a great branch line of trade to Yakutsk, the market of North-eastern Siberia, and since 1879 great efforts have been made to utilize the North-east Passage and the vast river-system of the north. The resources of the country will be still further opened out by the railway authorized in 1881, which is intended ultimately to run from the Urals to Pekin, a distance of about 3500 miles. Telegraphic communication, with branches to China and Japan, has existed since 1867.

Manufactures and Commerce.—Siberia possesses tanneries, iron foundries, glass works, and manufactures of coarse woollens and linens; but their number is inconsiderable and their produce unimportant, except in Irkutsk,

Tobolsk, and some of the provincial capitals. There are smelting and refining works connected with the mines.

The inland traffic is of considerable extent. The central region of the Obi and the Irtysh is noted for its magnificent pasturages and corn-fields, the latter yielding 2,200,000 teleuts of grain in an average year. The wandering Kughis tribes excel in the raising of stock, and upon the steppes bordering upon the Irtysh there are 1,200,000 head of cattle. The sedentary part of the population earn their living by fishing and shooting, and in the vicinity of Tomsk and Tobolsk the fish, which is taken in large quantities, is frozen and sent off to Russia. The inhabitants have for a long period done very well with the game which they have killed, but of late years such a vast area of forest has been cleared that game of all kinds is much less abundant than it was. At Tobolsk the women make fur coats and pelisses, besides gloves made of reindeer and goat skin. The trade in squirrel skins is very large also. Most of the animals are snared, a gun being rarely used, and the nomad tribes are principally engaged in their pursuit, the Russian inhabitants preferring to dress the furs and sell them. Oboorsk, which has a population of 500, and is situated at the extreme limit of the region which is inhabited, is celebrated for its fur trade, the fair held there every December attracting dealers from all parts of Siberia, Archangel, and the north of Russia generally, who bring with them manufactured goods, and spirits of wine, which they give in exchange. No exact figures are forthcoming as to the number of skins sold, but they may be estimated approximately at 500,000 squirrel skins, 10,000 white fox, and 15,000 ordinary fox skins, while Oboorsk itself supplies as many as 12,000 red bear skins, and as many fox skins. A very extensive transit trade is also carried on across the country between Russia and Europe and China. By far the most important article brought from the latter empire is tea, both in the dried leaf and in the form of cakes or bricks, the greater part of which is disposed of to the nomadic tribes. Other articles of importance obtained from China are silk, sugar, coarse cotton stuffs, rhubarb, porcelain, wool, grain, fruits, &c. The principal mart for this trade is the town of Kjachta. The exports to China consist of furs, skins, leather, articles of gold and silver, cotton and woollen cloths, laces, &c.

The administration of the country is divided into two general districts, Eastern and Western Siberia, which are subdivided into minor governments or territories as follows:—

EASTERN DIVISION.

Yeniseisk (Government).	Amur (Province).
Irkutsk (Government).	Mandchou Province.
Yakutsk (Province).	Ussuri Territory.
Transbaikalia (Province).	

WESTERN DIVISION.

Tobolsk (Government).	Tomsk (Government).
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HISTORY.—Europeans had not the least knowledge of the existence of Siberia up to 1580. It is, however, certain that a part of it was conquered by Genghis Khan and his successors. A Czech chief named Yermak Terofeyew crossed the Ural with a small marauding band in 1580, and made a rapid succession of conquests till 1584, when he was drowned in the Irtysh. After his death the subdued countries were lost to Russia, but the power of Katschum Khan (the Tartar chief of this part of Siberia) had been broken, and he was unable to resume his former position. The Russians continued gradually to push on, until his empire was entirely destroyed, and all the country west of the river Obi was subjected to the sway of the czar. In 1604 the town of Tomsk was built; and although the Siberians made many attempts to crush

the Russian power at this time, they failed. The invaders sent out small parties from time to time, which at length conquered the immense territory as far as the Pacific Ocean at Okhotsk. All this was effected in sixty years. The populous nation of the Buriates had been attacked and partly conquered in 1620, but they frequently rebelled, and their complete submission was not effected before 1658. Soon afterwards the town of Irkutsk was founded by Iwan Pochaboff (1661). The whole of these conquests were made by Cossacks for the sake of plunder, without expense to the government. The conquest of Da Uria involved the Russian and Chinese governments in disputes, which were, however, terminated by a treaty in 1689. This treaty determined the boundaries between the two empires; and it was confirmed by the treaty of 1727, in which Kiachta and Maimatshin were appointed as the only places where a commercial intercourse between the two countries should take place.

CENTRAL ASIA, or RUSSIAN TURKESTAN, is a vague term for Russia's possessions in Central Asia. This region, lying in the very heart of the great continent of Asia, and surrounded partly by vast deserts and partly by huge mountains, embraces some 500,000 square miles of what was, till recent years, probably the least known tract of country on the face of the earth. Siberia forms its northern boundary, and Afghanistan, Persia, and the mighty Hindu-Kush range its southern. From the Caspian Sea, which incloses it on the west, it stretches far away, about 1200 miles, to the great Thian-Shan or "heaven-seeking mountains," which separate it from China on the east. Here, at the juncture of the Thian-Shan and Hindu-Kush, there are the stupendous masses which, after rising far above the height of Mont Blanc, are topped with the wonderful plateau of some hundreds of square miles known as the "Roof of the World," or the Pamir Steppe. Running through it in parallel courses to the Sea of Aral are the great rivers anciently known as the Oxus and Jaxartes, now called the Amu and the Syr; the Oxus (Amu), being the largest interior river of Asia, descends from the lofty Lake Sir-i-kol on the Pamir table-land, at a height of 15,000 feet. These rivers, with the Zarafshan, Murghab, and some minor streams, create in their course several extensive oases, with the exception of which Central Asia is now a vast expanse of arid and barren desert, though formerly among the most fertile portions of the earth, and, there is reason to think, the cradle of our race. Thus, on its western or European front, Central Asia is covered by a bulwark of almost impassable steppe or desert; the oasis of Khiva, although the nearest or most westerly of all the fertile and settled districts, is separated from the Caspian by fully 550 miles of pure desert; while southwards of Khiva the Caspian desert extends inland in an unbroken waste of sand beyond Merv—which is distant from the Caspian about 500 miles—to the Persian frontier.

Tall reeds and sedges, with patches of woodland, line both the Amu and the Syr; but apart from the borders of lakes and streams, a tree is rarely met with, and the only vegetation is the thin grass common to a desert region. Wastes of loose sand continually shifting with the winds, small salt-pools, and saline marshes are characteristic of the general surface. Between the Amu and the Syr extends the desert of Kizil-Kum, or red sand, with that of Kara-Kum, or black sand, northward of the latter river, each of which is several days' journey across. The climate is dry and healthy; the sky is usually clear, and of the brightest azure; but great extremes distinguish the temperature, and hurricanes of tremendous violence sweep over the plains, driving the sand or the snow along in clouds, according to the season. In summer the thermometer rises to 108° in the shade, and to 144° in the sun; in winter it sinks to from 12° to 25° below zero, and

the cold is aggravated by strong blasts and the general want of food and fuel. The troops of Tamerlane were frozen to death on the banks of the Syr; and it was the natural obstacles occasioned by extreme climatic rigour which caused Central Asia to be so long a *terra incognita* to its European neighbours. The inhabitants are a medley of races, Kirghis in the north, Turkomans in the west and south-west, Uzbeks in the east and south-east, all Mohammedans, with whom Persians, Arabs, Afghans, Jews, and others are variously associated. Many lead a wandering life, rear sheep, goats, and horses, and were formerly much addicted to slave-dealing. Others are stationary, attend to agriculture, are highly commercial, and have various manufactures.

Of the products of the region perhaps the most important next to live stock is cotton, of which there are two varieties. It has already become indispensable to the Russian manufacturers, and Vambéry declares that it is of better quality than the Indian, Persian, or Egyptian, if not quite equal to the American. The best description is grown in Khiva, which is the chief area of the cotton cultivation in Central Asia. Sericulture, originally introduced by the Chinese, has also been long established in Turkestan, and especially in the eastern districts. Important articles of export are, further, the black lamb's wool, known in Europe as "Astrakhan;" the Turkoman horses, now supplying splendid remounts for the Russian cavalry; wool, hides, dyes, cereals, and fruits.

Since the reduction of the Akhal Tekke Turkomans in 1881 the locomotive has penetrated into Central Asia. The Trans-Caspian line, starting from Mikhailovsk, runs along the Daman-i-koh south-eastwards to Kizil-Arvat for Bami, and it was opened to Chardjui, on the Bokharan frontier, in December, 1886; it is being extended to Samarcand, and will then proceed to Tashkend.

The administration of Russian Turkestan is of a purely military character. The governor-general, or Yarin-padishah—that is, "Half-king," as the natives call him—has his headquarters in Tashkend. His jurisdiction embraces the Siberian provinces of Turgai, Akmolinsk, Semipalatinsk, and Semirechinsk; but the extreme west and south comprise the Trans-Caspian territory attached to the government of Caucasasia.

The other districts under the jurisdiction or the influence of Russia, with their areas, are as follows:—

	Area in Square Miles.
Sir-Darya (Province),	182,000
Amu-Darya (Circle),	41,000
Zarafshan (Circle),	9,800
Erghana (Province),	31,300
Semirechinsk (Province),	157,000
Urals east of the Ural (Province),	120,000
Turgai, exclusive of Nikolayevsk District (Province),	150,700
Akmolinsk (Sari-Snisk District),	92,100
Trans-Caspian Territory,	116,000
Bokhara (Khanate),	100,000
Khiva (Khanate),	23,000
Merv Oasis (Petty State),	1,000
Unclaimed Desert and Pamir,	500,000
	1,557,200

The total population cannot be given with any degree of accuracy.

SIBILANTS are those spirant consonants which "hiss" (Lat. *sibilo*). The sibilant *par excellence* is the surd sibilant spirant, the letter *s*; and its companion, the sonant sibilant spirant, is the letter *z*. With these lingual sounds are respectively connected the pair of palatal sounds, represented, owing to the paucity of our alphabet, by the

double letters *sh, zh*. The first, or lingual pair, *s* and *z*, are produced by the tip of the tongue approaching closely to the teeth, but leaving just enough space for a thin sheet of air to pass hissing through; the difference being that during *s* the vocal chords are inactive, and no sound but the sibilant is heard—it is a pure consonant in fact—whereas during *z* there is action on the part of the vocal chords, and the sibilant is accompanied by faintly audible utterance. There is also more effort in the sonant than the surd sibilant: the tongue is held more stiffly. Both sounds require the tongue to be hollow on its upper surface; defective front teeth or a tongue imperfectly mobile prevent their owner from pronouncing *s*, and force him to substitute either *sh*, or more probably *th*. In the second or palatal class of sibilant spirants, *sh* and *zh*, the tongue lies high in the mouth, and nearly flat, except at the tip, which is bent downwards; a flat stream of wind is therefore forced between the whole breadth of the tongue till not far from the tip and the front of the palate. The difference between *sh* and *zh* is exactly the same as that between *s* and *z*. Occasionally other letter-signs serve for those here given—as for example *c* for *s* (*centro* *s* for *z* (*because*), *ti* for *sh* (*condition*), and *ci* for *zh* (*vacuum*), a lamentable example of redundancy.

English is a very sibilant tongue, and has grown more sibilant as it has grown older—most unfortunately, as we may say, regarding it from a musical point of view. There are several causes. First, the early predominance of Anglian or North English over Saxon or South English literature, caused the Saxon form *eth* (I sleep) to be replaced by the hard Anglian form *es* (he sleeps). Secondly, the Old English plurals in *-as, -a, -u, -o, -a*, became, after the Norman conquest, reduced to *-es, -en, -e*, then to *-es, -cu*, and finally to *-es* or *-s*, although *as* was originally but the plural masculine of one solitary declension. Except the "strong plurals" made by vowel change (as *foot, feet*, &c.), all our plurals are now sibilant in a most provoking way, and thus, moreover, is an inflection shared by no other nation. From being, in its earliest forms, one of the least sibilant of Teutonic tongues, English has become perhaps the most sibilant of all—which is to say, it is the most sibilant tongue in the world, for Teutonic tongues have an evil repute for sibilancy. The unhappy plural *s*, which is our chief curse, is due to the French influence of our Norman and Angevin monarchs; and when we assimilated our plurals to our own native plural in *as*, we sounded the *s*, as in that declension we always had done, whereas our neighbours across the Channel, more prudent, drop the *s* in speaking, and reserve the great sibilancy of their speech for the eye, mercifully sparing the ear.

These two are the chief causes of English sibilancy, and into other subordinate causes it is perhaps not necessary to go. In Shakespeare's time, and the time of King James's Bible, both forms of the verb (*-eth* and *-s*) above alluded to were in use, at all events in the south of England. Every one must have remarked the beauty of Elizabethan speech in this particular. "My soul doth magnify the Lord, for he hath regarded," &c., "The Scripture moveth us," &c., are the familiar Prayer Book forms. Shakespeare uses the southern form where he can. See the exquisite verses on the "quality of mercy" in the "Merchant of Venice" (iv. 1). "It droppeth as the gentle rain from heaven," &c.; but metre often constrains him to use the sibilant form when perhaps he would not, as in this other sentence from the same speech, which contains both the *-eth* and the *es*:—

"It is twice blessed:
It blessing him that gives and him that takes."

SIB'YL (Gr. *sibylla*, as if from *louē*, counsel, and *aios*, the Doric for *Dios*, of Zeus; that is, one who reveals the counsels of Zeus or of God), the name given to several prophetic women belonging to the mythical ages of ancient

history. Pausanias, in his account of the Sibyls, applies the name to female soothsayers of historical times. In more correct language, however, it only applies to mythical personages. The Sibyl of Cumæ, in Campania, has acquired more celebrity than any other. The ancient legend is this: In the reign of Tarquinius Superbus, there appeared before the king a woman, either herself a Sibyl or sent by a Sibyl, who offered to the king nine books for sale. Her name was Amalthæa, and her books were collections of prophecies written in Greek upon palm leaves—at least Varro thus describes them. Tarquinius refused to purchase them, whereupon the woman burnt three of the books, and returning asked for the remaining books the same price as she had asked for the nine. The king again declined purchasing, but when the woman, after burning three books more, returned and asked for the three remaining the same price which she had before asked for the nine, his curiosity was excited, and he purchased the books, whereupon their vendor vanished. These three books were the Sibylline Books which play such a prominent part in the history of Rome. They contained oracles and prophecies for all occasions, and were held to be of such importance that they were kept in the temple of Jupiter Capitolinus, where they were preserved in a stone chest, under the care of special officers (*dumviri sacrorum, interpretes, or sacerdotes sibyllæ*), who had to consult them (*adire libros sibyllinos*) on all occasions when the gods manifested their wrath by inflicting calamities upon the Romans. Subsequently the number of keepers was increased to ten, and in Sulla's time to fifteen; and they consulted the sacred books when they were authorized by a *senatus consultum*. In B.C. 83 the temple of Jupiter was burnt, and the sacred books in it; but a new collection was made by collecting the Sibylline verses preserved in various towns in Italy, Greece, and Asia Minor. These mysterious verses were guarded with care under the empire, and great severity was used towards those who circulated spurious verses—Augustus had over 2000 such books destroyed, B.C. 12. The collection was burnt again in the time of Nero, and again it was restored. In A.D. 270 we read of a proposal made in the Senate to consult them. About the same time the Christians, in their zeal to convert the heathens, began to refer to the Sibylline oracles as containing prophecies respecting the Messiah. The collection, which was in the keeping of the state, was burnt a third time in the reign of Julian, called "the Apostate," in A.D. 363; and a fourth time in the reign of Honorius, by Stilicho, in 395. It was restored each time, and notwithstanding all the forgeries which must have crept into it, continued to be held in great esteem, as it was a useful instrument in the hands of the various parties, political as well as religious. Hence we find it consulted even as late as the middle of the sixth century of our era, during the troubles with the Goths. The collection was utterly destroyed at the burning of the capitol in 670 A.D.

A complete collection of Sibylline verses was compiled and edited by Gallus (Amsterdam, 1689, 4to), but it contains a great many spurious verses by the early Christians. In 1817, Angelo Mai published a collection of fragments from the Sibylline Books, which he discovered in a MS. of the library at Milan. Another collection of fragments was published by C. L. Struve, under the title "*Sibyllinorum Librorum Fragmenta*" (København, 1818, 8vo).

The number of the Sibyls is variously given. Perhaps the most orthodox number is four, the Erythrean or Cumæan, the Samian, the Egyptian, and the Sardinian, the first being that Amalthæa who dwelt at Cumæ, in Æolia, who offered the Sibylline books to King Tarquin, and whom Virgil introduces in the *Æneid* as the conductress of *Æneas* to the infernal regions. But many classical writers enumerate ten, and give as their places of abode Babylon, Libya, Delphi, Cimmeria, Erythraea, Samos, Cumæa, the Hellespont, Troy, Phrygia, and Tibur.

In mediæval times twelve Sibyls were reckoned, and according to tradition, each of these had given a prophecy relating to Christ, intermixed with their purely pagan oracles. Each Sibyl has her own emblem also. Michelangelo has given a magnificent representation of the entire group as part of the decorations of the roof of the Sistine Chapel in the Vatican. These are majestic seated female figures; and an excellent specimen of them, in the shape of the Delphic Sibyl, is given as an illustration to the article *Fresco*. The list is such as follows:—

(1.) The Sibyl of Delphi (see *Plate, Fresco*). Oracle, "The prophet born of the Virgin shall be crowned with thorns;" emblem, a crown of thorns.

(2.) The Sibyl of Libya. Oracle, "The day shall come when men shall see the king of all living things;" emblem, a lighted taper.

(3.) The Sibyl of Samos. Oracle, "The rich one shall be born of a pure virgin;" emblem, a rose.

(4.) The Sibyl of Cumæ in Italy. Oracle, "Jesus Christ shall come from heaven, and live and reign in poverty on earth;" emblem, a crown.

(5.) The Sibyl of Cumæ in Æolia. Oracle, "God shall be born of a pure virgin, and hold converse with sinners;" emblem, a cradle; and so forth for all the rest.

The list is as early as the sixteenth century in this form, and probably older. It is evidently a clumsy forgery; but the connoisseur is familiar with the emblems and oracles in the mediæval art-works. In addition to the Sistine Chapel already mentioned, the splendid inlaid floor of the Cathedral of Siena (lead outlines in grooves cut into the white marble pavement) may be referred to as an art-work of world-wide fame, a large part of which consists of the figures, oracles, and emblems of the twelve Sibyls. Forgery though it be, it is evident that this collection has in its day enjoyed great credence.

SICILIAN VESPERS. See *ANJOU, COUNTS AND DUKES OF*.

SICILIANA is a musical form made from a dance-measure common in Sicily, and is a kind of slow pastoral, in 6-8 or 12-8 time. Handel uses it occasionally, and Bach is fond of it as a slow movement in suites for the violin, &c.

SICILY, the largest, finest, and most important island in the Mediterranean Sea, is separated by a narrow channel (which it is now proposed to tunnel), called the Strait of Messina, from the southern extremity of Italy, of which kingdom it now forms a part. Its coast line embraces many excellent harbours. The island is in the shape of a triangle, of which the northern and southern sides are each about 200 miles long, and the eastern 115 miles. In consequence of its triangular shape the island, in ancient times, was sometimes called *Triquetra*, but more commonly *Trinacria*, or Three-cornered. It derived its present name from the Siculi, who were reputed its earliest inhabitants. The nearest point of Italy is 3 miles distant; Malta is 60 miles; and Cape Bon, on the African coast, 85 miles off. The area is 11,290 square miles. The population in 1881 was 2,922,757.

Surface.—A succession of mountain groups extends across the island from north-east to south-west, taking the names, first of the Neptunian, and then of the Madonian Mountains, but now known as the Peloric chain. It bears a singular resemblance to that branch of the Apennines which stretches to the south extremity of Italy, and strongly countenances the opinion generally entertained that it was originally continuous with it, and consequently that Sicily must at one time have been a part of the European continent. Few summits in the island, with the exception of Etna, exceed 6000 feet in height. Towards the eastern coast rises the detached group of *ETNA*, at the southern base of which lies the plain of Catania, the largest in the island. There are smaller plains along the southern shore,

near Alicata, Terranova, Marsala, and at Melazzo on the northern coast, but the surface of the island chiefly consists of mountains and valleys. The north is generally high, the mountains in many places coming close to the sea. Few of the rivers flow continuously all the year, and none are navigable. Most are torrents, with a short and rapid course, dry or nearly so in summer, but swelling into formidable floods in the rainy season, when they become impassable for days together.

Many of the mountains have, in the course of ages, been stripped of their ancient forests, and they now present a naked and barren appearance. The royal forests near Catania and Mezzojuso are, however, still important, and there is also an extensive wooded region around Etna.

Minerals.—The principal rocks in the mountain districts are quartz, granite, and mica. In some parts these are overlaid by limestone formations, as in the Apennines. The minerals are more numerous than valuable. They include argentiferous lead, quicksilver, iron, copper, and antimony, in quantities so limited that few of them are worked; lignite, bitumen, petroleum, and naphtha, asbestos, gypsum, emery, alum, rock-salt, nitre, sulphur, and a great variety of marbles, agates, chalcedonies, and jaspers. The most important of all is sulphur, which has been worked in mines for more than three centuries, and is extensively exported. It is chiefly worked by Cornish miners and their descendants. The sulphur is found in tertiary formations, and the beds extend in the centre and the south over an area of 2600 square miles, in which about 150 mines are wrought. Medicinal and sulphurous springs are very numerous.

Climate.—The climate is generally delightful, and very healthy, except where the air becomes tainted by the effluvia of morasses and stagnant pools. The thermometer in the hottest days rises to 90° or 92°, and even in the depth of winter very seldom falls below 36°; the medium temperature is 62° 5'. Snow is never seen, except on the summits of the highest mountains. The sky in summer is for the most part beautifully clear and serene, but after the autumnal equinox dews and fogs increase, and rain falls in frequent and heavy showers. The prevailing winds, the north and west, are dry and salubrious; those from the east render the atmosphere hazy and dense, and are often accompanied with rain and thunder; the most annoying wind is the south-east or sirocco, which, blowing from the deserts of Africa, not only is almost intolerable from its stifling heat, but produces oppressive dejection and lassitude. Hail-storms are frequent. The regular rains usually commence in November, and continue to fall at intervals till March, while long droughts not unfrequently prevail from April till November, particularly in the interior. Another evil from which Sicily suffers is the frequency of earthquakes, which usually take place towards the end of winter.

Products and Manufactures.—The soil has been always famous for fertility. It was, in fact, the principal granary of Rome. Sicily was believed to have been the native country of corn, and agriculture to have originated here under the auspices of Ceres. When the island came into the possession of the Italian government in 1860, however, it was most wretchedly cultivated, but improvements have since been effected. The papyrus of the Nile is found near Syracuse alone in Europe. The cultivation of corn is said to occupy about one-half of the tilled land. Barley, Indian corn, and beans are also grown. Excellent cotton is produced near Mazzara, and first-class sugar along the southern coast. A great deal of wine is made. The Marsala is best known in England. Dried raisins are exported from Messina, which port is also the depot for the currants of the Lipari Islands, of which several thousand barrels are yearly exported to Trieste, England, and America. Oranges and lemons are fine and plentiful. Olive and linseed oils, lemon juice, as well as essences of

lemon and other fruits, are made for exportation. An extensive industry has sprung up in the manufacture of citric acid and its salts. A little tobacco is raised, and nearly 50,000 lbs. of raw silk are produced every year. Liquorice-juice is made in large quantities. By far the most valuable export is that of sulphur. Kid and lamb skins are dressed for exportation.

The domestic animals of Sicily—with the exception of goats, of which there is a good breed, and of mules, to the proper rearing of which a great degree of attention is paid—are of an inferior description.

The manufactures are of very limited extent, and when not entirely domestic, are confined to a few of the larger towns. They include the ordinary silk, woollen, linen, and cotton tissues, for the most part of a coarse description: oilcloths, leather, cordage, glass, gloves, soap, artificial flowers, paper, earthenware, &c. The manufacture of silk was introduced from Greece in 1147. More than 200 miles of railway connect the chief towns of the island, but some good ordinary roads are much needed in the interior for the proper development of the resources of the country. The commerce would soon become far more important than it is were the inhabitants more industrious and enterprising. Almost the only branch of trade for which the Sicilians seem to show any particular predilection is that of fishing. Besides the sardine and tunny fisheries around their own island, the coral fishery on the African coast is frequented by many fishermen from Trapani, where the coral procured is polished. The most important articles of export are grain, fruit, wines, sulphur, oil, sunnich, bailla, silk, liquorice, and cream of tartar; the imports include colonial produce, cotton and woollen yarn, linen, cotton and woollen goods, hides, earthen ware, hardware, &c. Messina, Palermo, Trapani, and Catania are the chief seats of commerce. The telegraph is now extended to the Continent and to all parts of the island.

Religion, &c.—The established religion is Roman Catholic, to which the people nominally belong, though there are a considerable number of Greeks, who profess the worship of their own church. There are also a few thousand Jews. The people are very ignorant, but education has been more attended to since 1860. Palermo and Catania have universities. Bridgeway is an munimorial institution. A nearly roadless country, where populous valleys are divided by almost trackless mountains, renders the island a paradise of robbers.

The island is divided into seven prefectures or provinces—Palermo, Messina, Catania, Noto or Syracuse, Caltanissetta, Girgenti, and Trapani. Each of these is subdivided into three or four districts, and these again into numerous *comuni* or townships. There is a very fair system of local self-government, and deputies are also sent to the national Parliament at Rome.

Sicily, long an important portion of the kingdom of Naples, now forms a part of the kingdom of Italy. In prehistoric times the aboriginal inhabitants of Sicily seem to have been conquered or displaced by a branch of the Latin family, named the Sikani, from the southern portion of the mainland. After these came the Phœnicians, and in about B.C. 735 the Greeks established themselves on the eastern coast. Then followed the hostilities of the Carthaginians, and the conquest of the island by the Romans. In 210 Sicily became a Roman province, and remained under this rule till the third century A.D. In 827 the Saracens landed, and their dominion over the island lasted till 1090, when the Norman rule began. In 1282 Peter of Aragon became king of Sicily, and the Spanish kings held it, with Naples on the mainland. Garibaldi's conquest of the Neapolitan kingdom added Sicily to Italy in 1860. The architectural remains on the island bear witness to the frequent changes of ownership, and in the deep rocky valley of Ipsaca, on the south coast, westward of Cape Passaro, is

perhaps the most anciently occupied site in Sicily, or in Europe, which still retains inhabitants. This valley has on one side a wall of perpendicular rock, which presents a prodigious number of small excavated chambers, arranged over each other in several storeys, of 10 or 12 feet each, the opposite side exhibiting the same appearance, but to a less extent. There are as many doors as chambers, all of the same size and workmanship, almost all of the same form, and evidently designed for the same purpose. Each chamber forms a square with obtuse angles, 18 feet long by 6 wide, and as many in height. The valley presents this appearance for the length of 3 miles, and was therefore once the seat of a numerous population. In some instances a second chamber occurs behind the first; and occasionally the upper communicate with the lower by round apertures, where doubtless temporary ladders were placed, serving instead of staircases. The dwellings were evidently constructed by a very rustic people, for not a straight line appears, nor a right angle, nor an arched roof, nor a smooth surface. The origin of this curious troglodytic city, now the abode of a few peasants, is involved in complete obscurity.

SICYON (Gr. *Σίκυον*), a Peloponnesian state, one of the smallest of the states of ancient Greece, situated on the south-east of the Corinthian Gulf, and near the eastern extremity of the gulf. It consisted of a plain country along the coast, and a higher tract extending a few miles inland. The area was about 100 square miles. The old town of Sicyon was on the coast, and became the port when the new town was built a short distance inland. When Pausanias visited it in the second century of the Christian era it still contained works of some of the great sculptors of Greece.

The political history of this small state is unimportant. It was the birthplace of the distinguished statesman Aratus. Herodotus mentions it as subject to Argos. As a school of art Sicyon holds a distinguished rank; and it gave its name to one of the great styles of painting. This school was founded by Lupaneros, and produced Pamphilos and Apollonios. Sicyon was also one of the most ancient seats of sculpture, and was the birthplace of the sculptor Lysippos (Lysippos).

SIDA is a genus of the order MALVACEÆ, containing numerous species, which are very extensively distributed throughout the warm parts of the world. The species are herbs and shrubs, generally abounding in mucilage, and many are used medicinally in India. The root of *Sida acuta* is esteemed as a stimulant, and is used in ague, dysentery, and as a remedy for snake bites. The leaves of other species are used as a poultice, and for rheumatism. The bark of some species contains strong pliable fibres, which are employed for cordage and textile purposes. *Sida filicoides* is cultivated in China for the sake of its fibre, which is preferred to hemp; and its cultivation has been introduced into Europe.

SIDDONS, MRS. SARAH, a celebrated tragic actress, an eldest daughter of the celebrated John Philip and Charles Kemble (see KEMBLE). She was born at Brecon, in South Wales, on 5th July, 1755. She was the eldest child of Roger Kemble, the manager of a provincial company, and while a mere infant made her first appearance on the stage on the occasion of her father's death. From that period she continued to perform regularly in her father's company till she attained her fifteenth year. Having formed an attachment to a young actor named Siddons, which was not approved of by the family, she was removed from the theatre, and placed under the protection of Mrs. Gresham, of Guy's Cliff, Warwickshire. The young couple, however, were married at Coventry on 26th November, 1773, and the bride returned to the provincial stage at Cheltenham in company with her husband. Here she attracted great attention; her fame reached the metropolis, where she made her first

appearance at Drury Lane on 29th December, 1775, in the character of Portia in the "Merchant of Venice." She was announced simply as a "young lady;" and, though favourably received, failed to make any strong impression. Her next performance was as Lady Anne in "Richard III.," in the course of which she disobeyed a stage direction, lost the favour of Garrick, and with it her chance of re-engagement. In the summer of 1776 she appeared at Birmingham. From Birmingham she went to Manchester, York, and Bath, increasing her reputation to such a degree that offers were again made to her from the metropolis; and on 10th October, 1782, she reappeared at Drury Lane as Isabella in the "Fatal Marriage," followed up by a succession of triumphs in other characters which established her fame. She continued to play at Drury Lane until the difficulty of obtaining her salary from Sheridan drove her to Covent Garden in 1803, where she played until she took her farewell of the stage, 29th June, 1812. After this period she only appeared on behalf of charities or benefits, but for a few seasons she gave a series of wonderful public readings from Shakspeare and Milton. She died at London on 8th June, 1831, and a colossal statue of her by Chantrey, the cost of which was defrayed by Manecady, was placed in Westminster Abbey some years after her death.

Mrs. Siddons was of medium height, symmetrical and majestic in figure, and she possessed splendid powers of voice and expression. Her beauty is preserved in her famous portrait by Reynolds, in which she is represented as the Tragic Muse. Her genius at first inclined to pathetic characters, as Isabella, Ophelia, Jane Shore, Belvidera, or Euphrasia, but later to those of power and majesty, and her grandest personation was that of Lady Macbeth. Her private character was irreproachable, and she numbered among her friends Johnson, Reynolds, Burke, Fox, and many other members of the best society in England.

SIDE. In modern mathematics this term means nothing but one of the lines which bound a figure, extending from one angle or corner to the next. In common language side is a vague term, and is also used differently in and out of composition. First we have the *inside* and the *outside*; then, with reference to either of these, we have *sides before* and *behind*, *above* and *below*, *right* and *left*. The first pair is defined by reference to the spectator, the second by the direction of gravitation; but the third, with reference to which the term *side* is most frequently used, cannot be defined by the mathematician. The anatomist will say that, in the human body, the *right side* is that on which the heart is not, and the *left side* that on which it is, and there is no other definition. In every case in which the terms *right* and *left* are applied, there is a reference to the position of the human body. Thus the *right wing* of an army means that which is towards the right hands of those in the centre; as soon as a retreat commences the names of the right and left wings are changed. The *right bank* of a river is by convention named on the supposition that the person who names it is looking down the stream, or seeing the water flow from him. Perhaps some may doubt whether the superior and inferior parts, or the anterior and posterior, are in our language properly called *sides*. It must be observed, however, that the words *fore-side* and *back-side* are very good English; and that in the phrase *upside-down* we see the remains of the corresponding phrases *up-side* and *down-side*.

SIDE DRUM. See DRUM.

SIDE/REAL (Lat. *sidus*, a constellation; *sideral* would be more correct), applied in astronomy to distinguish that which has reference to the fixed stars from that which relates to the sun, moon, planets, or comets. Thus we have the *sideral year*, which is the interval taken by the earth to make one complete revolution in its orbit as measured by its position relative to the fixed stars. The length of

the sidereal year is 365 days 6 hours 18 minutes 21 seconds, which is less than the "tropical year," our ordinary year, by nearly 20½ minutes. The *sidereal clock* is a convenient piece of apparatus for the astronomical observatory. It marks sidereal and not average solar time.

SID'ERITE (Gr. *sideron*, a star) is the general mineralogical name applied to the various naturally-occurring forms of carbonate of iron. It has reference to the occasional occurrence of this mineral in crystalline nodules, with a radiating star-like structure when viewed in section, and the term was originally restricted to such varieties. The ferruginous carbonate is rarely pure, even when crystallized, certain proportions of manganese, aluminium, magnesium, and calcium being almost invariably mingled with it. When associated with a large amount of alumina, it exhibits an earthy texture, and is found in nodular beds as a valuable ore, commonly designated **CLAY IRONSTONE**. When mixed only with isomorphous carbonates (e.g. of manganese, magnesium, and calcium), it is often perfectly crystallized in small rhombohedra of a light-brown colour and a pearly lustre, and met with in mineral veins, associated with various metallic ores; in this case it bears the common name of *Spathic Iron Ore*.

SIDERITIS is a genus of plants belonging to the order LABIATÆ. The species are numerous, herbs, undershrubs or shrubs, natives of Southern Europe, temperate Asia, and the Canary Islands. Dioscorides mentions three varieties, which were celebrated for stanching blood and healing wounds. *Sideritis romana* (Roman ironwort) is a native of the Mediterranean. It was found by Dr. Sibthorp in Greece and the isles of the Archipelago; and Sir J. E. Smith believes it to be identical with the *sideritis* of Dioscorides. It flowers from June to August, and attains a height of about 6 inches. *Sideritis canariensis* (Canary Island ironwort) attains a height of from 3 to 6 feet, and is often cultivated in our gardens. Another species frequently grown in gardens is the Syrian or Sage-leaved Ironwort (*Sideritis syriaca*); it is a native of Candia and Palestine, and grows to the height of from 12 to 18 inches. The flowers are small, usually yellow, placed in the axils of leaf-like bracts.

SIDEROXYLON is a genus of plants belonging to the order SAPOTACEÆ. Its species are natives of Africa, America, the East Indies, and Australia. They are remarkable for the hardness and weight of their wood, which sinks in water, and the genus has hence derived the name of Iron-wood. They are generally trees, with alternate evergreen leaves and axillary clusters of flowers, which have both corolla and calyx deeply five-cleft. The fruits are roundish berries, about the size of a cherry, containing from one to three seeds. *Sideritis dulcificum*, a native of western tropical Africa, has very sweet berries, resembling olives in shape, but about half the size, which are eaten to counteract the acidity of other food or drink. The plant is called by the English residents the Miraculous Berry.

SID'MOUTH, a watering-place of England, in the county of Devon, situated at the mouth of the Sid, 11 miles E.S.E. from Exeter, and 168 from London by the South-western Railway. The town is in front of the sea, and the narrow valley behind it has detached houses and villas on each side of the small stream which flows through it. The hills on each side of the valley rise to a considerable height, and where they terminate on the sea-coast form bold and rocky cliffs, east and west of the town, 500 feet high. This protection renders the town remarkable for the mildness and salubrity of its climate. Sidmouth was formerly a considerable fishing town, but the harbour has been choked up, and the town would have fallen into decay had it not risen into some importance as a watering-place. There are baths, public rooms, a library, hotels, boarding and lodging houses, and a fine promenade,

1½ mile long, formed by the sea-wall. The town possesses a thorough system of drainage, and is now admirably supplied with water. The Church of St. Giles has a fine window given by the queen in memory of her father. The population in 1881 was 3475. At the beginning of the century Sidmouth was the most fashionable and aristocratic watering-place on the coast of Devon, and it continued to flourish until the extension of the railway system diverted its traffic, and left it "out of the world." It was the residence of the queen with her mother during her early childhood, and here, in 1820, her father, the Duke of Kent, died.

SIDMOUTH, HENRY ADDINGTON, VISCOUNT, was the son of Dr. Anthony Addington, a physician of some eminence. He was born on 3rd May, 1757. On leaving Oxford he entered himself a student of Lincoln's Inn, and was called to the bar on 11th May, 1781. A week later he was returned to Parliament as member for Devizes, and he filled the office of Speaker from 1789 to 1801, when, on the retirement of Pitt in March, 1801, he was induced to undertake the formation and chiefship of a new ministry, with the offices of chancellor of the exchequer and first lord of the Treasury.

The most memorable event of his short administration was the peace of Amiens. Soon after the renewal of the war in the beginning of 1803, Pitt, who had hitherto supported his old friend, began to intimate an apprehension that he was scarcely equal to the crisis, and then joined Fox and the Opposition. The result was that Addington resigned, and Pitt was restored to power in the May of the following year. The weakness of the Addington ministry was well embodied in the *bon mot* attributed to Sheridan, "Pitt is to Addington as London is to Paddington." The new government was supported by Addington, who, in January, 1804, again took office as president of the council, being at the same time made a peer by the title of Viscount Sidmouth. The premiership, however, he resigned in the July following.

When Mr. Fox and Lord Grenville succeeded to power in February, 1806, after the death of Pitt, Lord Sidmouth was made Lord Privy Seal; and on the reconstitution of the cabinet in October was replaced in his former post of president of the council, which he held till the breaking up of the government in the March following. In April, 1812, in the last moments of Mr. Perceval's administration, he was appointed president of the council for the third time. In June of the same year, when Lord Liverpool assumed the premiership after the assassination of Mr. Perceval, Lord Sidmouth became secretary of state for the home department. He finally retired from official life in 1824; but continued for some years to attend frequently in the House of Lords, though he seldom spoke. He died on 15th February 1844, at his residence, the White Lodge, in Richmond Park.

SIDNEY or SYDNEY, ALGERNON, an illustrious English patriot, was the second son of Robert earl of Leicester, and was born in 1622. He was carefully educated and entered public life in 1644, when, on the breaking out of the rebellion in Ireland, he went over to that country, of which his father was then lord-lieutenant, and received command of a troop of horse. Subsequently, in 1643, he returned to England with his elder brother, Viscount Lisle, ostensibly to join the king, then at war with the Parliament, but both brothers on arriving joined the Parliamentary forces. In 1644 Algernon was appointed a captain in the Earl of Manchester's regiment, and he fought gallantly at Marston Moor. In April, 1645, Fairfax raised him to the rank of colonel and gave him a regiment; and in 1646 his brother, Lord Lisle, having become lieutenant-general of Ireland, he was made lieutenant-general of the horse in that kingdom and governor of Dub-

lin. In 1647 he received the thanks of the House of Commons for his services, and the same year he was appointed governor of Dover. In 1648 he was nominated one of the judges of the king, but for some reason unknown he took no part in the trial, and did not sign the warrant for the execution, though he is reported to have afterwards spoken of the execution as "the justest and bravest action that ever was done in England or anywhere else." He strenuously opposed the establishment of the protectorate, and refusing to accept any employment under the government of Cromwell, he retired for a time from public life, living at the family seat of Penshurst in Kent.

On the restoration of the Long Parliament in May, 1659, Sidney again came forward, and on the 13th of the month was nominated one of the council of state. On the 5th of June following he was sent to Denmark to negotiate a peace between that country and Sweden, and he was absent upon this mission when Charles II. was restored to the throne. During the next few years he lived a wandering life on the Continent, and after vainly endeavouring to stir up the Dutch and the French against the Stuart dynasty, in 1677 he obtained a pardon from Charles II. and permission to return home. The earl, his father, died the same year, leaving him a legacy of £5100, but he was prevented from recovering this by his brother, who instituted a tedious and costly suit to set aside the father's will, and Sidney, who at first remained in England against his desire, was at length driven into public life as an opponent of the corrupt and tyrannical court of Charles II. By the court party he was both hated and feared, and when the Rye House Plot was discovered in 1683, Sidney was immediately arrested along with his friend, Lord Russell, and committed to the Tower on a charge of high treason. He was hanged on 21st November before the brutal Jeffreys, and by a most iniquitous perversion of law and justice was found guilty. He was beheaded on Tower Hill on 4th December 1683, meeting his death with the most heroic fortitude. His public murder aroused much sympathy and indignation at the time, and his attainder was reversed after the Revolution.

Sidney is described by Evelyn as "a man of great courage, great sense, and great parts," and he appears to have been regarded in this same light both by friends and enemies. His "Discourses on Government" were first published in 1698; in 1704 another edition was issued, a third appearing in 1751, and a fourth in 1772.

SIDNEY, MARY, COUNTESS OF PEMBROKE, deserves commemoration as a woman of highly cultivated mind, and as the beloved sister of Sir Philip Sidney. She was born at Penshurst Place, in Kent, in 1576, was married to the Earl of Pembroke, and died in 1621 at her town mansion, 1, Aldersgate Street, London. She translated

Her Poem to English verse; wrote an elegy on her brother, "The Doleful Lull of Chlorinda," published Spenser's "Astrophel," and a "Pastoral Dialogue" in praise of Queen Elizabeth. It was at her instigation that Sir Philip Sidney composed his romance of "Arcadia," which after his death she arranged and published in its present form. Her epitaph by William Brown, but usually wrongly attributed to Ben Jonson, is justly celebrated. It is given in the article HERSEY—

"Underneath this sable hearse,
&c.

SIDNEY, SIR PHILIP, an English statesman, soldier, author, and one of the brightest spirits of the Elizabethan age, was born 29th November, 1554, at Penshurst in Kent. He was the son of Sir Henry Sidney, and was placed at school at Shrewsbury. In 1569 he was entered at Christ Church, Oxford, and is said to have held a public disputation with Carew, the author of the "Survey of Cornwall." In 1572 Sidney proceeded on his travels. Paris was his first halting-place; but on the occasion of

the massacre of St. Bartholomew he was obliged to shelter himself at the house of Sir Francis Walsingham, the English ambassador. After quitting that city he visited Belgium, Germany, Hungary, and Italy. On his return home in May, 1575, Sidney at once became a courtier, and from this time to the end of his life he continued a special favourite of Elizabeth.

It was in consequence of the favour with which he had been received by Elizabeth that he essayed his first literary attempt, a masque, entitled the "Lady of May," which was performed before the queen at Wanstead House in Essex. In 1576 he was appointed ambassador to the court of Vienna, and returned to England in 1577. Soon after his return, when it was supposed that the queen was favourably disposed towards the negotiation for her marriage with Henry, duke of Anjou, Sidney addressed to her the celebrated "Remonstrance," which the queen appears to have received without resentment, notwithstanding her high temper and imperious disposition. Soon afterwards a quarrel at tennis with the Earl of Oxford occasioned his temporary retirement from court. Wilton, the seat of his brother-in-law, the Earl of Pembroke, was his retreat, and during this seclusion, chiefly spent in the company of his sister, the Countess of Pembroke, he commenced with her a metrical version of the Psalms, and afterwards at her request the composition of his "Arcadia." This work was published in 1590 under the title of the "Countess of Pembroke's Arcadia," and it was universally read and admired at the time of its publication, subsequently passing through many editions. In 1581 the "The Defence of Poesie" was composed, but did not appear till 1595. It is replete with fine images and noble thoughts, expressed in very eloquent language. In 1583 he married Frances, only daughter of his old friend Sir Francis Walsingham.

During the war between the Spaniards and the Dutch, the queen, in order to mark her sense of his merits, in 1585 appointed him governor of Flushing. After some successes against the enemy, he was induced, by the chivalrousness of his disposition, to attempt with a small force the surprise of a body of 3000 men who were marching to relieve Zutphen, a town of Guelderland. During the engagement which took place Sidney received a wound from a musket bullet in the left thigh. The anecdote related by Lord Brooke of his conduct on leaving the battlefield, when, faint and bleeding himself and suffering from intense thirst, he handed his untasted water to a dying soldier, saying, "Thy necessity is yet greater than mine," illustrates his general character. The wound was mortal, and after many days of severe suffering he died at Arnheim, 7th October, 1586. His body was brought in great pomp to England and interred in St. Paul's Cathedral.

England had the good fortune to receive the Reformation and the Renaissance at the same epoch, and Sidney may be said to have summed up in himself all that in each movement was finest and most noble, taking from the one a certain gravity of mind and lofty independence of thought, and from the other culture, chivalry, statesmanship, and urbanity. Graceful writer though he was of sonnet and lyric, master of delicate and refined prose, yet "his end," as Fulke Greville tells us, "was not writing, even while he wrote." The whole tenor of his career shows his determination "to subordinate self-culture to useful public action," and the most perfect of all his poems was his own life. Three centuries have passed since he died at Arnheim, yet we can still feel the fascination of his gracious personality, and catch something of the charm that made all men love him.

Sidney's life was written by his friend Fulke Greville (1652), by Dr. Zouch (1808), by Mr. Lloyd (1861-62) and by H. C. Fox Bourne (1862). There is also a good biography of Sidney in the English Men of Letters Series, by J. A. Symonds (London, 1886). A new edition of the "Arcadia" appeared in 1867, and the latest and most

complete collection of his poems is that made by the Rev. A. B. Grosart (three vols., London, 1877).

SIDNEY-SUSSEX COLLEGE, Cambridge, was founded in 1596, on the site of a monastery of Gray Friars, pursuant to the will of Frances Sidney, countess of Sussex, who died in 1589. It was intended to support a master, ten fellows, and twenty scholars; but the estates being found inadequate after defraying the building expenses, the number of fellows was reduced by the executors to seven. Two more, however, were afterwards added by Sir John Hart, citizen of London.

There are four Lady Sidney Scholarships of at least £60 per annum; two Brereton Scholarships of £50 per annum; six Taylor Scholarships of £50 per annum; six Taylor Scholarships of £30 per annum; and six others of £10. Three Blundell Exhibitions, for Tiverton School, £60 per annum; four Johnson's Exhibitions, with preference to Oakham or Uppingham Schools, £30 per annum; two Lovett Exhibitions for clergymen's sons, with preference to those educated at Grantham or Oakham Schools, £50 per annum. There are now ten fellowships, one of which is a Professorial Fellowship. The fellows must be elected from graduates of the college, or, if the governing body think fit, from among graduates of the University of Cambridge or of Oxford. A fellowship is vacated one year after presentation to a college benefice worth not less than £400, but is otherwise tenable for six years. Each fellow receives a dividend of not more than £250 a year, besides rooms and commons when in residence. The college is situated on the east side of Bridge Street. It is entered by a neat portico, and consists of two courts built of brick. The chapel and library were rebuilt in 1780.

Oliver Cromwell entered at Sidney College, but left without taking a degree, apparently to manage his property on his father's death. Another distinguished member was Thomas Fuller, the antiquarian and historian.

SIDON or **ZIDON**, the most ancient, and for a long time the chief city of Phœnicia, and probably the mother-city of Tyre. It lay on the coast of the Mediterranean, in a plain about a mile broad, 200 stadia from Tyre. It possessed a good harbour, and at a very early period became a great maritime and commercial centre. The Sidonians are supposed to be the first manufacturers of glass, and their skill in arts and manufactures is frequently referred to by Homer, as well as by later writers. They were worshippers of the goddess Ashteroth, whose head is commonly found upon their coins.

Sidon was gradually eclipsed by Tyre, which became the chief city of the Phœnicians. Still it was an important place, and furnished the best ships for the fleet of Xerxes, B.C. 480, at which time it was governed by a person whom Herodotus calls a king. After being burned and rebuilt in the time of Artaxerxes Ochus, it submitted to Alexander the Great. Finally it fell into the hands of the Romans, but remained a place of importance long after the Christian era.

The modern town is on the north side of a steep promontory extending into the Mediterranean, 18 miles south of Beyrout. It is called *Saida*, and some traces of the original Sidon are supposed to remain about 2 miles inland. The population of *Saida* is now about 5000, three-fifths of whom are Moslems, 600 Jews, and the rest Catholic and Maronite Christians. There is a school and Protestant chapel here, conducted by American missionaries. In the sixteenth century the harbour was rendered unfit for anything but boats, and the commerce of the town declined on the rise of Beyrout; yet its bazaars are still well supplied, and it has some trade in silk, fruit, oil, and gall-nuts. The vicinity abounds with orchards and plantations. *Saida* contains the ruins of a castle, and its peninsular site is shut off from the mainland by walls.

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SIEBENBURGE (or the "Seven Mountains"), a range of mountains, remarkable rather for their picturesque character and conical summits than for their loftiness, extends along the right bank of the Rhine, about 20 miles above Cologne. The highest summit is the Löwenkopf, 1560 feet; the most celebrated, the Drachenfels, which has long enjoyed the immortality of song and legend. It is "the castled crag of Drachenfels" of Byron's "Childe Harold."

SIEGE. See FORTIFICATION.

SIEGFRIED is the hero of the great Teutonic myth-epic, the *NIBELUNGEN LIED*, or at least of its first part. Under the name of Sigurd (or more correctly Sigurdr) he is also a chief figure in the *Volsunga Sag* of the Norse mythology. The two myths may be treated here together.

Taking first the Norse version, we find Sigurd born of Hjordis after the death of his father Sigmund, and after the marriage of his mother to Hladprick, king of Denmark. The usual relations between stepfather and stepson ensue, and Sigurd was but too ready to seek adventures in consequence. A cunning smith, Regin by name, taught him much magical art, and forged a wondrous sword wherewith Sigurd might slay the dragon Fafnir (in some mysterious way the dragon was brother of this same Regin) and seize the golden treasure which Fafnir guarded. Regin's real aim was to secure the treasure for himself, which he hoped would be an easy task when both Fafnir and Sigurd were exhausted or perhaps slain. Those who hunt to death solar hypotheses as explanations of myths are unanimous in regarding Fafnir as the dragon-shaped cloud which hides the gladdening golden sunlight from man, and which the lightning pierces. Regin's sword went to pieces under Sigurd's heavy strokes, and the dragon was almost unhurt until Sigurd obtained his father Sigmund's sword Gram. To test Gram he first drove it up to the hilt into Regin's anvil, and then cut in two a lock of wool floating on the surface of water. When he had slain Fafnir and grasped the treasure it is little wonder to find him turning upon the faithless smith and slaying him also. Sigurd sought in marriage Gudrun, sister of Gunnar. Now Gunnar was in love with the Valkyr Brynhild [see *BRUNHILD*] and could not get at her, as she lay in a magic sleep, for the ring of fire that surrounded her. Sigurd, taking Gunnar's shape by magic art achieved the feat, received Brynhild's vows in the guise of Gunnar, then made way for the real king and himself married Gudrun. Thus (say the solar theorists) is evidently the sun freeing the maiden of spring, for whom the cold earth is longing. Be that as it may, the secret leaked out through the pride of Gudrun, and her indiscreet taunts caused such a torrent of hate to spring in the breast of Brynhild that she rested not until she had compassed the murder of Sigurd. Yet she loved and admired him so much that she flung herself on his funeral pile and perished with him in the flames. Gudrun left her home and married Atli, king of the Huns. Here we are told we have the power of darkness symbolized, for did not Atli soon invite Gudrun's brothers, owners of the sunlight (i.e. Sigurd's treasure), to visit him, that he might rob them? But the brothers buried their hoard in the Rhine. Arrived at Atli's court their slaughter was not long delayed, and then, in revenge, like another Medea, Gudrun slew her own children by Atli. The victory of darkness is the death of all things, say the interpreters of the solar theory.

In many points the Siegfried of the Teutonic epic coincides with the Sigurd of the Norse saga. He was a Netherland prince, the son of Sigmund, a Wölfung, who traced his descent direct from father Wotan himself; and his mother, Sieglinde, was of equally high lineage in some accounts (notably in the version followed by the musical composer Wagner) the two are brother and sister. The masterful spirit of Siegfried as a boy involved him in such endless quarrels that his father sent him to the smith

Mimir in the forest, to learn how to forge the weapons he would one day use. His strength was so great that when he had acquired skill enough to forge a sword, and was permitted to make the attempt, he drove Mimir's anvil a foot into the earth at the first blow and scattered the sword-steel in splinters. Mimir now determined to make away with the lad and sent him to the forest to get charcoal, at the same time rousing a fearful gigantic serpent or "worm" to be in wait for Siegfried to devour him. The hero had found many horrible creatures in a morass and had covered them with a heap of wood, torn from the trees of the forest. The charcoal-burner whom he asked for fire to set light to his pile with, told him of the danger he was in from the worm. Siegfried undauntedly finished the firing of his pile first, and the burning of all the poisonous brutes of the morass. As they burnt a little stream of hot fat ran from the fire. Siegfried dipped a finger into it; it was covered with a horny scale instantly. Seeing the importance of the discovery he stripped and bathed in the fluid, and became the horny one, with a skin impervious to all weapons except in a little place between the shoulders, where a leaf had been blown upon him and had stuck to his skin, preventing the magic bath from reaching it unknown to him. He next met the dragon and despatched him with his club, and returning to the forge he destroyed the worm. Then with great care he forged himself a sword, which he indicated in the blood of the slain worm.

When the time of marriage had come Siegfried set out to seek a bride; and first he went to Iceland to see the famous Brunnhild, whom he found contending with her sister in named combats, resolved to wed no man who could not conquer her. He threw a spear or so to show his prowess, and then left her, feeling her to be too like a man as she stood there in full panoply of war, a head taller than he.

He then attracted his fancy. How Siegfried could do this and the treachery of the Nibelungs is told in the article NIBELUNGEN-LIED. Siegfried heard next of the fame of the three royal brothers of Burgundy and of their lovely sister Chriemhild, and he journeyed to their court at Worms. Here he fell in love with Chriemhild in her rose garden. During his stay Siegfried joined King Gunther of Burgundy in an expedition against Saxony and Denmark, in which he defeated and took prisoner with his own hand both the Danish and the Saxon kings. While the rejoicings were still continuing on the return of the victorious expedition the Princess Chriemhild was carried off by a fearful flying dragon. Siegfried alone pursued her, and after many dangers and adventures, due as much to the treachery of the giant Kriemhild, whom he had forced to assist him, as to natural dangers, although these were terrible enough, he discovered his princess in the dragon's lair, and succeeded in killing the monster. The mountain by the Rhine which witnessed this feat has ever since been called the Dragon Stone (Drachenstein). How Siegfried died is told in the article NIBELUNGEN-LIED. He was slain for King Gunther of Burgundy by the plot of Gunther's sister Chriemhild and by the deception by which he had won her love. Chriemhild is a queen—told in the articles under BRUNNEN and NIBELUNGEN-LIED, as well as his murder by Hagen, the knight King Gunther, to avenge the wrath of the Burgundians, grown furious with shame. In the article NIBELUNGEN-LIED the subsequent fate of Chriemhild and her brothers is found to be in many particulars the same as that of Gudrun and her brothers in the Volsung Saga.

SIEMENS, SIR WILLIAM, an eminent inventor and engineer, was born at Lenthe, in Hanover, 4th April, 1833. He was educated at the gymnasium at Lubeck, afterwards at the Polytechnic School at Magdeburg, and finally at the University of Göttingen. In 1852 he became

a pupil in the engine works of Count Stolberg, and here he laid the foundation of that knowledge of engineering which he afterwards turned to such good account. He was one of a family of inventors, and it was to introduce to the English public a joint invention of his own and his brother Werner in electro-gilding that William Siemens first came to England in 1813. He disposed of the invention on satisfactory terms to Messrs. Elkington, and the following year he introduced his chronometric governor, intended originally for steam-engines, but which has found its chief use in its application in the great transit instrument at Greenwich. His next studies were directed towards the utilization of the heat wasted by the imperfect furnaces then in use, and in 1847 he set up his first regenerative steam-engine at Bolton. The system thus introduced failed to secure commercial success, but in 1861 he succeeded, in connection with his younger brother Frederick, in designing his greatest invention—the regenerative gas furnace, which has since been largely utilized in steel and glass making, and in many other important industrial purposes. The application of the furnace to the making of iron and steel naturally led the attention of its inventor to other improvements in the same manufacture, and after several years had been devoted to experiments the Siemens' process of steel making was perfected, and a little later still the Siemens-Martin process. At a later period Siemens turned his attention to electric engineering, and designed the steamer *Faraday* for the special work of cable-laying, his designs and arrangements being of the most masterly character. Electric lighting then came in for a share of his attention, and though his claim to be the discoverer of the principle on which modern dynamo machines are constructed has been contested by other inventors, there can be no question that he was one of the earliest and most successful workers in this new field of discovery. As regards the electrical transmission and conveyance of power, with the important exception of storage batteries, most of the modern advances in this direction are due to the firm of which he was the head.

The honours he received for his inventions and discoveries were very numerous. In 1850 he received the gold medal of the Society of Arts for his regenerative condenser, and in 1874 the same society awarded him their Albert medal for his improvements in metallurgy. From the civil engineers he received the Telford medal in 1863, and in 1883 the Howard Prize, which had only once been awarded before—viz. to Sir Henry Bessemer. In 1883 he received the honour of knighthood. His numerous contributions to scientific literature are to be found in the *Proceedings* of the Royal Society, the British Association, the Institution of Civil and Mechanical Engineers, the Society of Arts, and other learned societies. He died 18th November, 1883.

SIENA, a city of Central Italy, and the capital of the province of the same name, is situated on three small hills surrounded by others, 30 miles south from Florence and 45 miles E.S.E. from Leghorn, on the road from Florence to Rome. It is connected with all three cities by a railway. The town is immediately surrounded with trees and avenues, which have a fine effect. Siena is an archbishop's see, has a university (founded in 1330, especially famous as a school of medicine, and which has now nearly 200 students), a public library of 50,000 volumes and 5000 valuable MSS., several palaces, and handsome new municipal buildings, a gymnasium, a clerical seminary, and several schools. It possesses also an academy of the fine arts, a large hospital, an orphan asylum, a workhouse for the destitute, a savings' bank, and an asylum for poor children. The population in 1881 was 25,204. The principal manufactures are silks, woollens, leather, and paper; and in the neighbourhood some marble quarries are worked. The town also has a good trade in oil, wine, corn, and other agricultural produce. (Siena is the Roman *Senā*

Julia, a Julian colony among the Senonian Gauls, founded by Augustus, and by him given the right, still used, to wear the Roman wolf as the cognizance of the city.)

Sienna abounds with fine churches, all decorated with paintings by good masters. The cathedral, erected, it is said, on the ruins of a temple of Minerva, is rich in marbles, sculptures, and paintings. The exterior is cased with black and white marble in horizontal alternating bands. The history of the cathedral is the history of Sienna, which was among the proudest of Italian cities. In fact in 1260, after the victory at Monte Aperto, Sienna discussed with Pisa the question of razing Florence to the ground, so complete was her supremacy at the time. The mighty cathedral went on growing as the city grew, and John of Pisa (Giovanni Pisano) himself had to design the great west front, a work in coloured marbles unrivalled in Italian Gothic even by his own lovely façade at Orvieto. This façade took from 1270, when John began it, till 1380 to build. In fact the mosaics adorning it were only finished in 1878. The dome was finished in 1264. There was a parish church (St. Giovanni) on the side of the hill crowned by the cathedral, and the great fabric extended itself in 1317 clean over the top of St. Giovanni, turning it into a sort of crypt. At this time there were not less than 100,000 inhabitants in Sienna, and the mad design came to them to turn the great building into a transept and run a colossal nave athwart it (1339). Before they got more than a bay or two built, whose great skeletons yet remain to point the tale, the city was overwhelmed in ruin by the plague of 1348. The celebrated *graffiti* or inlaid designs, which quite cover the marble cathedral pavement, are now mostly removed to the Duomo Museum for preservation, and are replaced by modern facsimiles. Except on great occasions the pavement is covered with a wooden floor. The frescos in the library of the cathedral by Pinturicchio (1505-07) are world-famous. They are a truly magnificent series on a grand scale, and represent passages in the life of Pope Pius II., a native of Sienna and a great benefactor to the town. It was he who made it an archbishopric. The memorial was ordered by another Piccolomini, Pope Pius III., nephew of Æneas Sylvius (Pius II.), and is often called the Sala Piccolomini. One of the paintings depicts the canonization of St. Catherine of Sienna, a special glory of the town, and certainly a very remarkable woman apart from her sainthood, for she it was mainly who succeeded in restoring the popes to Rome from their "exile" at Avignon. The famous "Majestas" by Duccio di Buoninsegna, painted in 1310, still adorns the cathedral. In its day it was the most famous of paintings, and miracles are accredited to it. The splendid chapel of the Chigi family was constructed by Pope Alexander VII. The baptistery is adorned with sculptures by the earliest Tuscan artists. In the Church of San Domenico is a good painting on wood, of the date 1281, by Guido of Sienna, long before the birth of Cimabue. In fact the Siennese school was a worthy rival of the Florentine in the beginning of art.

The Piazza del Campo, mentioned by Dante ("Purg." xi. 134), is concave and roughly semicircular in outline, so that it resembles a shallow theatre. It is still used as a racecourse on certain festival days in July and August: it was once the forum of the republic of Sienna, and is one of the finest squares in Italy. Eleven thoroughfares branch out of it. Along the chord of the semicircle of the piazza stands the very fine ancient red-brick building of the Palazzo Pubblico (built 1289-1309) with a lily-tower only surpassed by that of Florence. This tower is called *Torre del Mangia* (Tower of the Ogre), from a gigantic figure which used to strike the hours on a bell at the top. At the foot of the tower a beautiful memorial chapel was made in 1318 in thanksgiving for the cessation of the great plague which ruined Sienna. It was formerly the *loggia*

of the town, answering the purpose of our "hustings." There is a beautiful "Loggia de' Nobili" covered with exquisite decorative carving, in a street just without the Piazza. The houses of the Piazza, many of them with battlements, &c., are now shops and warehouses, but retain most of their ancient features; and in the early morning or by night Sienna looks much as it did in Dante's time. In the midst of the Piazza stands a marble replica of the grand fountain, always called by its Roman name, *Fonte Gaja*, and the work of Jacopo della Quercia (1419), perhaps the finest of all fountains, which was so renowned that the artist was usually called "della Fonte." The exquisite bas-reliefs of the original were getting gradually destroyed, so the authorities wisely removed them to the Duomo Museum, and replaced it by a new facsimile. The water of the "Fountain of Camis" (*Fonte Gaja*) is brought 18 miles by a conduit. Ruskin in his most wrong-headed style eloquently laments the removal of the Fonte Gaja from the Piazza, though if it was not to perish utterly this was the only thing to be done. The streets of the town are generally narrow, crooked, and uneven; and its appearance is almost the same as of old, a priceless relic of an Italian mediæval fortress town. The inhabitants have always been noted for the purity and melody of their speech.

Sienna is well supplied with good water by aqueducts from the neighbouring hills, some of which were made during the period of the Roman dominion; and is adorned with several handsome fountains. The earth of the neighbouring hills gives the well-known pigment Terra di Sienna, either as Raw Sienna (yellow) or as Burnt Sienna (red-brown), and in either state a remarkably fine colour.

Sienna was taken by the French in 1808, and from that time to 1814 was the capital of the département of Ombrione. No less than 126 popes have been natives of this city.

SIERRA, a word meaning "a saw," introduced by the Spaniards into geography to designate a range of mountains with jagged ridges.

SIERRA LEONE (i.e., "Mountain of the Lion"), the name of a cape and English colony situated on the west coast of Africa. This colony, with recent annexations, now occupies a coast-line of some 180 miles, has its south-eastern boundary contiguous to the negro republic of Liberia, the Mannah River dividing the two countries, while the northern boundary is approached by the Scarcia River. The inland boundaries never having been surveyed, it is with difficulty that an accurate area can be arrived at, but, with recent additions, it is estimated that the government have jurisdiction over not less than 3000 square miles.

The capital is Freetown, situated on a small peninsula about 18 miles long, and is approached by the Rokel (or Sierra Leone) River some 4 miles from its mouth. Next in importance, if not, indeed, taking first place as an export station, is Sherbro, distant about 80 miles from Freetown. In 1881 the population was 60,516, and of this number the capital contained 22,000. There were only 163 resident whites; 35,400 were stated to be liberated Africans and their descendants, while the remainder were composed of a large variety of mixed tribes. The small community is an epitome of all Africa, no fewer than 60 languages being spoken in the streets of Freetown. The interior is an elevated region of uneven surface, and generally barren soil, though the country immediately around Freetown is very fertile, and abounds in the most varied pictures of gorgeous tropical scenery. The British have introduced the products of the West Indies, which generally succeed well. Some European fruits are cultivated, and the vine flourishes in the gardens of Freetown. Yams, mandiocas, pumpkins, plantains, Indian corn, and rice constitute the principal food of the inhabitants. Nearly all the English garden vegetables are raised.

There are two seasons, the wet and the dry. The former lasts from May to November, and is ushered in and terminated by tornadoes. Nothing can exceed the gloominess of the weather during this period. The hills are wrapped in impenetrable fogs, and the rain falls in such torrents as to prevent any one from leaving his house. At this time the diseases which prove so fatal to Europeans generally make their appearance; and their destructive character has led to the colony being sometimes called "the White Man's Grave." With strict moderation and proper care, however, life is far more tolerable here than some twenty-five or thirty years since, the climate having really undergone a change for the better in consequence of cutting down trees, drainage, reclamation of surrounding marshes, and the general enforcement of sanitary laws. Being at no great distance from the equator, a high degree of heat is experienced all the year round, the mean being 81° and 82°. There is a pretty regular succession of sea and land breezes.

The principal live stock consists of poultry, pigs, and goats. The wild animals in the neighbourhood are the elephant, buffalo, a species of antelope, monkeys, leopards, and wolves. The hippopotamus is found in the lower parts of the rivers, and several kinds of snakes are numerous. The guinea-fowls, which are plentiful, are much larger than those in England. Fish abounds in the rivers and along the shores. Wild bees are very numerous, and honey and wax constitute articles of export. Salt is made along the low shores.

Agriculture, in the true sense of the term, is very little carried on. There are, in fact, no food resources of any kind except fish, which is good and plentiful; that is to say, there are no stocks, and if Sierra Leone were cut off from England and America for three months it would be in a semi-starving condition. Rice is the only food supply that is kept, and the quantity grown, owing to the disturbed state of the rice districts, has much decreased. The climate is favourable to the growth of sugar, cotton, cocoa, and coffee. One peculiar production is the cola-nut, which has the property of postponing the feeling of hunger. It is said that one nut would sustain a man's strength during a long day's march.

The revenue of the colony, which may be said to average £65,000 a year, is derived principally from customs. The duties on spirits and tobacco form the bulk of the taxation. The governor is aided by an executive and legislative council, four of the latter body being native representatives nominated by the crown.

Sierra Leone was chosen on account of its excellent harbour as a coaling station for ships of the royal navy, and is the headquarters of the West India Regiments stationed on the West Coast of Africa. Freetown is connected by telegraph with England. Religious institutions flourish. It would be difficult to find an English colony where there is a greater number of churches and chapels of every denomination. The Church of England, which is presided over by an English bishop and a numerous native pastorate, numbers over 20,000 adherents. Sierra Leone has always been strongly supported by the Church Missionary Society. Fourah Bay College, where a few students matriculate every year, is affiliated to Dublin University.

The colony was established in 1787 by some philanthropists, who intended to show that colonial productions could be obtained without the labour of slaves. In that year 470 negroes, then living in a state of destitution in London, were removed to it; and in 1790 their number was increased by 1196 individuals of the same race who had settled in Nova Scotia, but could not bear the severity of that climate. In 1819, when a black regiment in the West Indies was disbanded, 1222 negro soldiers and their families were settled there likewise. After the abolition of the slave trade the slaves captured by the British cruisers were

settled in the colony; and the population has in consequence very much increased. The Mandingoes, who dwell chiefly in the villages around Freetown, are very intelligent. They employ themselves in forging metal and working in leather, can generally speak and write Arabic, and are Mohammedans. There are several other races who, with the Mandingoes, were the original inhabitants of the district.

SIER'RA MORE'NA, a long continuous range of mountains in Spain, dividing the basins of the Guadiana and Guadalquivir. Nominally the range extends from the Sierra de Alcaraz, in the south-west of the province of Albacete, 250 miles west to the valley of the lower Guadiana; but the chain, in its widest sense, includes all the heights from Cape la Nao, opposite the island of Iviza on the Mediterranean, to Cape St. Vincent on the Atlantic. Highest point, Aracena, 38 miles south-west of Llerena, 5250 feet.

SIER'RA NEVA'DA ("Snowy Range"), a mountain chain of Andalusia in Spain, extending from Padul to the borders of Almeria, or about 60 miles in length, with an average breadth of 25 miles and a total area of 1100 square miles. The highest summit is the peak of Mulhacen, 11,781 feet; that of Veleta, 11,597. The snow continually crowns the crests of this romantic range, which gives birth to numerous streams and torrents.

SIES'TA, the name given to the midday sleep or rest indulged in by the Spaniards, and the inhabitants of hot countries generally, who repose for two or three hours in the middle of the day, or after dinner, when the heat is too oppressive to admit of their going from home. The word comes from the Latin *sexta*, that is, *hora sexta*, the sixth hour, reckoning from sunrise—the hour of noon.

SIEYÈS, EMMANUEL JOSEPH, commonly called the *Abbé Sieyès*, was born at Fréjus on the 3rd of May, 1748. He completed his studies at the University of Paris, where his mind became imbued with the philosophical speculations prevalent at that period, and he applied himself to the investigation of the various schemes of social reform which were suggested. By the patronage of the Bishop of Chartres he was appointed to a canonry in that cathedral, and afterwards became vicar-general and chancellor of the diocese. He took an active part in various assemblies of the clergy, and warmly espoused those opinions which were producing the revolution of 1789. When the disordered state of the public finances compelled the government to summon the States-general, the question arose in what manner that body should be constituted; whether, when they were assembled, they should vote as in the last assembly of 1614, by orders, or as individual members? To this question Sieyès replied by three pamphlets, which were skilfully adapted to the prevailing opinions on the subject. The second and most remarkable was entitled "Qu'est ce que le Tiers État?" in which he asserted that the Tiers État was the nation itself. On the convocation of the States-general Sieyès was elected deputy for Paris. He has the credit of having suggested the new division of the kingdom into departments, though the scheme was explained to the Assembly by Thouret.

He was elected in 1791 to the Legislative Assembly, and also to the Convention for 1792. But he took no active part in either of these bodies. At the trial of Louis XVI., in January, 1793, he voted for the king's death. During the Reign of Terror Sieyès kept out of the way, and luckily escaped the scaffold. After the fall of Robespierre he returned to the Convention, and by his influence obtained the recall of the proscribed members of the Girondo party. In 1795 he again took an active part in the management of affairs, and was named a member of the new Comité du Salut Public.

In 1798 Sieyès was sent on a mission from the French government to the court of Berlin, and though he failed in his attempt to form an alliance with that power, he suc-

ceeded in securing its neutrality. On his return to Paris in the following year he was named member of the Directory, though his dissatisfaction with the directorial administration was very well known. Placing himself at the head of a conspiracy which had been formed against three of his colleagues, who were known for their republican sentiments, he procured their forced resignation, and a new Directory was formed, in which the majority was favourable to his views. Another important act, which he effected through the instrumentality of the minister of police, Fouché, was the suppression of the Jacobin Club. These measures, as they destroyed the popularity of the author of the "Tiers État," made him anxious to secure the support of some military leader who was possessed of sufficient talent and energy to take upon himself the direction of the affairs of state. The man whom he wanted soon appeared. It was Bonaparte, who had just returned from his Egyptian expedition. The revolution of the 18th of Brumaire (9th November, 1799) was the result of the union of the soldier and the politician. These two, with Roger-Ducos, were made consuls; and two commissions of twenty-five members each were appointed from each council of state to assist them in the formation of a new constitution. Sieyès and Bonaparte soon disagreed. Sieyès had, according to his practice, elaborated a paper constitution, which was not accepted. In most of the many constitutions tried by republican France he had been the master-builder, and with the pride of greatness he remarked at the outset of his career to a friend that "politics [*i.e.* the science of government] was a science he had completely mastered." This unlucky speech makes him a favourite butt for Carlyle ("History of the French Revolution"), all the more as none of his many constitutions ever worked for more than a few months. This last new arrangement, in which the "complete master" was not allowed to meddle, was the only one of all which really did work after a fashion, thanks rather to the genius of Bonaparte than to any merits of its own. In place of a tool Sieyès had got a master, and the proclamation of the new constitution of December, 1799, terminated his political career. But he received the solid indemnity of a large sum of money, a fine estate, and the rank of senator.

Under the Consulate and the Empire Sieyès took no part in public affairs, but accepted the title of Count. At the Restoration he was exiled, and only returned to France after the revolution of 1830, fifteen years afterwards. He died at Paris in obscurity, 20th June, 1836.

SIGHING is a deep, silent, and long-drawn inspiration, often chiefly through the nose, followed by a somewhat sudden and correspondingly vigorous expiration.

The cause of sighing is the simplest possible. It is only the necessity for balancing the respiratory efforts. When, therefore, a terrible and crushing grief partially paralyzes the mind so that we brood attentively upon our sorrow and unconsciously hold our breath (as we always do in the act of attention), or when we are so wrapt in an absorbing train of thought as to "forget to breathe," the shallow respiration which has been going on during our trance is compensated for by a deep sigh at intervals.

SIGHT (vision, the faculty of seeing). The structure and uses of the several component parts which enter into the formation of the organ of vision are stated under EYE. From a case recorded by Cheselden, in which a young man, who was born blind, was suddenly restored to sight by the operation of couching, we learn that the sense of sight originally gives us no information respecting the solidity, the distance, or the real magnitude of objects; but that they all seem as if painted on one surface. The lad couched by Cheselden could not recognize by sight the things whose form he before knew from feeling; but upon being told what they were, he would carefully observe that he might know them again. The infant, in like manner, stretches out its little hands to grasp and examine each object in

succession which attracts its sight, and the greater part of its waking hours is employed in thus comparing the sensations obtained through these two different channels. That we acquire important information respecting the size and forms of bodies through the sense of touch, there can be no doubt; that the knowledge obtained through our visual organs would be imperfect without it, and that it may in some measure be a corrective of those optical illusions which are so frequent when we attempt to judge of things by sight alone, is equally probable; but, in admitting this, we must not undervalue the original powers of the eye and the quantity of knowledge which we primarily derive from it. Physiologists have been too much swayed by the opinion of Gassendus, Haller, Gall, and others, that we see with only one eye at a time; and those even who disputed this have been more anxious to explain why objects are seen single with both eyes than to inquire into the uses of our possessing two. These defects, which are more or less common to all writers on optics, have been remedied by some very interesting observations of Professor Wheatstone on binocular vision, in which he has shown that the simultaneous affixion of the two retinas, provided the optic axes are not parallel, excites a different idea in the mind from that consequent on either of the single impressions; the latter giving rise to a representation on a plane surface, the former to that of an object in relief. This is owing to a different perspective projection of the object being seen by each eye: thus if any figure of three dimensions, a cube for example, is held at the distance of about 7 inches before the eyes, and viewed with each eye successively while the head is kept perfectly steady, the picture presented to the right eye will be different from that seen by the left. And thus it is that our conviction of the solidity and projection in relief of bodies depends upon a different perspective image of them being presented to each retina. As this, however, can only take place when the axes of the eyes are made to converge to them, it follows that when objects are at such a distance that in regarding them the optic axes are parallel, then images on the retinae will be exactly similar, and the idea conveyed to the mind will be the same as if they were seen with one eye only. We judge of the motion of bodies partly from the movement of their images over the surface of the retina, and partly from the movement of our eyes following them. If the image upon the retina moves while our eyes and body are at rest, we conclude that the object is changing its relative position with regard to ourselves. In such a case the movement of the object may be apparent only, as when we are fixed upon a body which is in motion, such as a ship. On the other hand, the image may remain fixed on the same spot of the retina, while our eyes follow the moving body; we then judge of its motion by the sensations in the muscles which move the eyes. If the image moves only in correspondence with the actions of the muscles, as in reading, we infer that the object is stationary. The colour of luminous bodies depends upon the quality of the light they emit; the colour of bodies that are not luminous is due to the light which falls upon them, and is reflected by them towards our eyes. When a body absorbs all the rays of light which fall upon it, its colour is black; when it reflects them all, it is white; and when it absorbs some and reflects others, it is coloured. The question has often been raised, why is it that we see objects erect while their images on the retina are inverted? According to most physiologists, it is by virtue of a certain property of the retina by which each point of an object is seen in the direction of a line perpendicular to its surface; now since this surface is concave, the rays proceeding from an object which fall on the lower part of its concavity will incline upwards, while those which impinge on its upper part will incline downwards; and thus the object presented to the mind will be the reverse of that which is depicted on the retina.

Myopia (near-sightedness or short sight) is from the Gr. *muo*, I shut, and *ops*, the eye, a short-sighted person being in the habit of blinking, or half-shutting his eyelids, when he endeavours to see objects distinctly. When the images of surrounding objects are brought to a focus in the eye before they reach the retina, such an eye is myopic, or near-sighted. Individuals thus affected cannot see objects distinctly at the ordinary distance of distinct vision, but require them to be brought nearer, so as to insure their images being at the proper focus for distinct vision. The cause of myopia is an over-refractive condition of the eye; either the cornea or the crystalline lens is too convex, or the humours of the eye generally are too dense or too abundant. The best means of alleviating this condition of the eye is the use of concave glasses. The manner in which concave glasses improve the vision of near-sighted persons is by causing a divergence of the rays of light before they enter the eye, thus counteracting the over-refractive condition of that organ. The glasses that are most commonly used are double concaves, of equal concavity on each side; they are numbered 1, 2, 3, 4, &c., beginning with the longest focus or shallowest concavity. Unfortunately there is no uniform standard adopted in the manufacture of these glasses, so that what one optician calls No. 1, another rates as No. 2, and so on; it is therefore advisable that those who wish to fit themselves with spectacles should try a series of them at an optician's shop, and they should be content with the lowest number with which they can see objects clearly across the street; if it diminishes them much, or gives them a dazzling appearance, or if the eye feels strained after looking through them for a short time, they are too concave. Spectacles are always preferable to a single eyeglass; and when the individual has not with a pair which suit him, they should not be heedlessly changed for any of deeper concavity. It is also advisable not to wear them constantly, but only on occasions when their assistance is actually required.

Hypermetropia (long sight or far-sightedness) as the name sufficiently indicates, is an affection the reverse of near-sightedness, and depends upon opposite causes. Either the refractive powers of the eye are too feeble, or its axis is shorter than natural; the result is an imperfectly-formed image on the retina from the rays of light not converging sufficiently soon to be brought to a focus. Hence the far-sighted person removes the object he is examining further from him, or he makes use of glasses whose effect is to increase the refraction of the rays of light before they enter his eye. In this case convex glasses must be employed. They should not be had recourse to too soon, nor should too high a power be used, but the lowest that answers the purpose should be chosen.

Presbyopia, or Old Sight (Gr. *presbos*, old), is the usual condition of the sight of elderly persons, by reason of the waning power of the muscles of accommodation, that is, the focusing muscles. Consequently the lens remains too flat for the perception of near objects, and the power of making it more convex which exists in younger eyes is now almost lost. The remedy is to use spectacles of various powers to suit various kinds of work as desired. The usual effect of old sight is to focus the eye for distant objects, so that presbyopia, the result of failing power, is often confused with true long-sight or hypermetropia, which is the result of a defective shape of the eyeball.

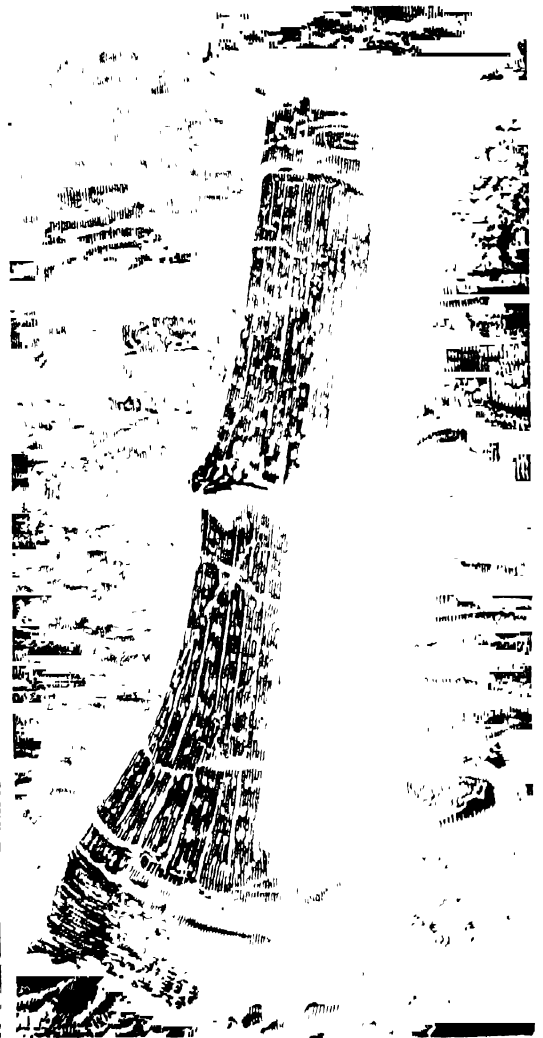
Double Vision may arise either from a want of correspondence in the movements or position of the two eyes, the vision of each eye singly being perfect; or there may be double vision with one eye only, while the harmony in the movements of the two is not disturbed. The most common example of the first form of the affection is afforded by cases of squinting. More serious and less common is the loss of harmony in the movements of the eyes which results from paralysis of one or more of the orbital muscles.

Other defects of the eye as a piece of apparatus are *astigmatism* and *aberration*, both spherical and chromatic. See **ASTIGMATISM** and **ERR.**

Defective Perception of Colours.—There are some individuals whose eyes present no apparent defect, and who can distinguish clearly the size and form of objects, yet are unable to perceive a difference between certain colours. These persons differ much in the degree of their defect, as well as in respect of the colours which they confound together. The defect is irremediable. See **COLOUR BLINDNESS**.

SIGHTING A BILL is the formal act of its presentation for acceptance to the person on whom it is drawn, at the proper date, so as to bring it under his sight. Many bills are payable *at sight*, but a considerable number, especially of foreign bills, are payable so many days *after sight* (as "thirty days after sight," &c.), and in this case their quick sighting is of great importance. The date of sighting is noted at the time on the bill, which then runs the full interval allowed after sight, and the three "days of grace" in addition.

SIGILLARIA (Lat. *sigillum*, a seal) is an important genus of fossil plants, so called from the numerous seal-



Trunk of *Sigillaria*, 12 feet high, in the mine of Treuil, at Saint-Etienne.

like leaf scars with which the surface of the bark is impressed. It is found in rocks of Devonian and carbon-

iferous age, but exhibits its maximum development in the latter, and its mineralized remains form no inconsiderable part of the majority of coal seams. The plant attained to very large dimensions, sometimes reaching a height of no less than 70 feet, and measuring 5 feet in diameter at the base; and in most cases the main trunk was unbranched, except towards the summit, when a forked mode of branching commenced. In many species the bark is observed to present longitudinal flutings, between which the scars are arranged in vertical series (see woodcut), while other forms show no such marked lines of division. In old trunks, moreover, the surface sculptures often become obliterated, and the bark much fissured and shrivelled. The leaves, though rarely preserved in position, were long and grass-like, and the fructification consisted in cones. The roots of *Sigillaria* originally received the name of *Stigmæria* (Lat. *stigma*, a dot), and were supposed to be a distinct plant creeping in mud-flats and marshes; their true nature was first demonstrated by Mr. Binney of Manchester, who discovered them in direct connection with trunks of *Sigillaria* in the Lancashire coalfields, and it is interesting to note that more recent researches have also demonstrated their similar relation to *Lepidodendron*. The punctures upon these roots, which suggested the original name, have a quincuncial arrangement, and mark the points of attachment of rootlets. On microscopical examination of satisfactorily preserved specimens, *Sigillaria* is found to possess a large central pith, surrounded by a woody zone and a ring of scalariform and other vessels, traversed by medullary rays, outside which is a thick cellular bark; and its precise position in the vegetable kingdom is not altogether determined. Brongniart and Dawson have considered the genus as probably allied to the Cycads, but Williamson and Cuscutis are inclined to regard it as truly cryptogamous, and referable to the Club Mosses (or Lycopodiaceæ). Closely allied to *Sigillaria*, or even perhaps forming part of certain species, are the vegetable fossils known as *Ulodendron*, *Rhytidodendron*, and *Favularia*.

SIGISMUND (or *Sigmund*), Emperor of Germany, or more accurately of the Holy Roman Empire, was the son of the Emperor Charles IV. and the brother of the Emperor Wenceslas, of the house of Bohemia. (Charles IV. was the sovereign who issued the "Golden Bull," fixing the mode of election to the empire.) Sigismund was born in 1368, and succeeded his father as Margrave of Brandenburg ten years later. He married Maria of Hungary in 1386, and was accepted as King of Hungary in that year; but on the death of his queen in 1392, Ladislas V. of Poland disputed his right to the throne. For the time, Sigismund was successful. He suppressed a rebellion in Wallachia, brought on by his own despotism, in 1393, but suffered a severe defeat at the hands of the Turks in that year. This seems to have turned his mind in the direction of the Crusade then preparing. He took the direction of it and was defeated at Nikopolis, 1396. He had pawned his margravate, and was hopelessly out of favour with his people. Indeed when he returned after long wanderings, his nobles flung him into prison (1401), and eventually gave the crown to Ladislas, king of Naples (1403). Sigismund escaped to Bohemia, where his brother Wenceslas now reigned, having been deposed from the empire in 1400 for misgovernment, in favour of Rupert the Elector Palatine. Here Sigismund got assistance, and after a struggle recovered his kingdom. When the Emperor Rupert died (1410), Sigismund and Jobst of Moravia were both elected to the empire. Fortunately Jobst soon died, so that after the formality of a second election, Sigismund was unanimously chosen emperor in 1411. Great hopes were raised, for his good qualities were known and it was hoped his troubles had steeled him. His rashness and his want of firmness, however, were productive of much evil.

The first great work Sigismund had to do was the organ-

izing of the Council of Constance (1414-18); he had insisted on its being called, in fact, against the wish of Pope John XXIII. He induced John Huss to attend that council by giving him a safe-conduct, and it is an everlasting black spot upon his memory that he abandoned that earnest reformer to his priestly foes, violated his safe-conduct, and allowed them to burn him at the stake. The excuse for the emperor is that probably had he not allowed Huss's prosecution the council would have broken up. He was very earnest in his endeavours to forward the work of the council in healing the long schism of the church, and himself personally visited the anti-pope Benedict XIII. in Spain in 1415, and negotiated with the various monarchs of Spain and Portugal; afterwards going to Paris in 1416 to make a treaty with Charles VI., and to England to effect the like purpose with Henry V. in the same year. It was not till 1417 that he returned to Constance. The fairly successful issue of that council must be attributed in no small degree to the emperor's efforts.

In 1419 Sigismund succeeded his brother Wenceslas (Wenzel) as king of Bohemia. The Bohemians had largely followed Huss, and the murder of Huss (1415) and of his disciple Jerome of Prague (1416), who had brought the Englishman Wyclif's writings to Germany, had embittered them against the emperor. If he had tried to conciliate the Hussites no doubt he might have succeeded peacefully to the crown; but he had thrown in his lot with the ultra-church party, and he began his reign with a fierce crusade against the heretics. The war which followed lasted fifteen years. The great leader of the Hussites was the famous Ziska, who even after he had become blind led his followers from one victory to another. Ziska died in 1424, but his spirit seemed to live in the Hussites long after, and a tiny defeated army after army sent against them. The Council of Basel met in 1431, and began negotiations with the Hussites, which ended in the reconciliation of part of them in 1433; and the diminished remainder were defeated in 1434 near Prague. Sigismund was then acknowledged by all men as king of Bohemia, but was crowned at Prague in 1436. He did not act fairly after his coronation, for his first effort was to annul the treaty of the council with the Hussites, and to endeavour to enforce the complete Catholic rite without those modifications which had been agreed upon in favour of the "Utraquists," as the reconciled Hussites were called. Sigismund had been crowned King of Italy in 1431 at Milan; and was crowned emperor by Pope Eugenius IV. at Rome in 1433. He had an excellent idea, centuries too early for realization, of forming a true German Union; but this failed when he attempted to realize it in 1437. It was his last effort. He died the same year at Znaïm in Moravia.

SIGISMUNDA is the heroine of one of Boccaccio's best tales in the "Decameron." She was the daughter of Tancredi, prince of Salerno, and loved Griselda, a page. Her father, when he discovered her passion, had Griselda murdered, and tearing out his heart sent it in a gold cup to his daughter. Those who love fine painting will remember a noble picture on this affecting subject in the National Gallery, by William Hogarth, in striking contrast to his realistic humorous style in other famous works.

SIGMUND is a hero of the Norse *Völsunga* Saga descended directly from Odin. At a wedding feast Odin entered the hall in the guise of an old man, and drew a sword from beneath his long cloak which he threw up to the hilt in the posts of the house, predicting that it was to him who should draw it thence again. This feat was accomplished by Sigmund, son of Volsung, who named the wonder sword Gram. With it he slew the children of his brother-in-law Siggeir, king of Gotland, because the latter had suffered father Volsung to be slain. After that he returned to his own land, married, and had children. But he fell in love with Hjördis, who yielded to his embraces;

and before their child was born he fell in fight with a prince who was a suitor for her hand. He left his sword Gram in charge of Hjordis to give it to their child if a boy. When born the child was the famous Sigurd or SIEGFRIED.

SIGN, in astronomy, a term formerly applied to any constellation, but in modern times only to a constellation of the ZODIAC. In the article *ARIES* the anomaly which exists, the *signs* being just one constellation out of their proper place, is explained fully.

SIGN, in mathematics. Every symbol is a sign of something or other, the original meaning of the word sign applying to any mark of distinction or designation. Such a general consideration of the subject of signs comes under the word *SYMBOLS*; as for this term sign, it is exclusively applied in mathematical analysis to the signs of addition and subtraction (+ and -). A positive quantity, as +3, is said to have the positive sign; a negative quantity, as -3, the negative sign; all quantities to which no sign is prefixed are held to be positive.

SIGNALLING. See *TELEGRAPH*.

SIGNATURE, in music, is applied to two diverse things, the *key signature* and the *time signature*. In the first case it is the term for the collection of sharps or flats at the beginning of a piece of music (usually repeated at the beginning of each line in printed music), which is rendered necessary to form the key of the piece. Our system regards all the notes in music as being in their "natural" form until altered by a sign, or "accidental;" therefore it is manifest that as the series

A B C D E F G A

cannot represent the major scale of A (since it has a minor Third, Sixth, and Seventh), it must have a signature of three sharps (F♯, C♯, G♯) at the head of the piece—the notes F, C, G, being read throughout, whether the signature be repeated line by line or not, as F♯, C♯, G♯; unless for any special purpose they are affected by an "accidental," natural, or double-sharp. See the articles *KEY*, *SCALE*.

The signature of a minor key, as it is the custom not to include the alteration of the Seventh of the scale in the signature, is the same with the signature of the major key three semitones above it. Thus the signature of D minor is the same as that of F major, notwithstanding that D minor has F♯ for its Seventh, and that therefore its signature should by all good rights be B♭, F♯. Custom decrees otherwise, and the Seventh is "accidentally sharpened" throughout as it occurs. There was an old custom prevalent down to about a hundred years ago, of leaving out the last flat of the signature of a flat key, and, though not so often, the last sharp of a sharp key, for which the only excuse would seem to be the saving of an alteration of signature when proceeding by modulation to the dominant and subdominant respectively. The signature B♭ would serve for the key B♭ and F its dominant on this system, G♯ being made by an accidental whenever required in the first key, and in like manner F♯ would serve as a signature for D and its subdominant G.

The order of sharps in the signature is invariable. It follows the order of keys, and ascends by Fifths from F♯, the first sharp used (as the signature of G); the order is therefore

F C G D A E B.

The order of flats is, conversely, by descending Fifths beginning with B♭, the first flat used (as the signature of F); and is therefore

B E A D G C F.

The French term for key-signature is *Signes Accidentales*, and the German *Vorzeichnung*.

The *Time Signature* is in the form of a fraction, the denominator indicating the fractional part of a semibreve,

and the numerator the number of such parts in each bar. Thus, $\frac{3}{4}$ means two quarters of a semibreve in each bar (i.e. two crotchets) and so forth. See also *TIME*.

SIGN-MANUAL means, in its widest sense, the signature or mark made by a person upon any legal instrument to show his concurrence in it. Before the art of writing was common, the sign-manual or signature was usually a cross, attested either by the seal of the party, containing his armorial bearings, or by the signature of another person declaring to whom the mark belonged. The latter is still the practice with persons who cannot write.

The term sign-manual is now used to denote the signature of a reigning prince. It is usually in this country the prince's name, or its initial letter, with the initial of his style or title in Latin. Thus the sign-manual of the queen is "Victoria R. et L.," or simply "V.R."

The royal sign-manual is usually placed at the top left-hand corner of the instrument, together with the privy seal, and it is requisite in all cases where the privy seal and afterwards the great seal are used. It must be countersigned by a principal secretary of state, or by the lords of the treasury, when attached to a grant or warrant, it being then the principal act. Where the sign-manual only directs that another act shall be done, as for letters-patent to be made, it must be countersigned by some person, though not necessarily by these great officers of state. The authenticity of the sign-manual is admitted in courts of law upon production of the instrument to which it is attached.

SIGNET, SEAL. The impression of a seal has been used from the earliest times to prove the authenticity of the documents to which it is attached. A seal, or something which is called a seal, is necessary in England to make the instrument called a deed.

The law recognizes three royal seals:—1. The Great Seal, which is in the custody of the lord chancellor, and is appended to all letters-patent. It contains two impressions, the one being usually the sovereign on horseback, the other the sovereign seated, supported by emblematical figures, and with the coat of arms somewhere in the field. It is essential to all royal grants of inheritances or chattels real, to grants of an office in fee, and to all writs at common law. Where the king's seal is mentioned, it is understood to be the great seal. 2. The Privy Seal, which is in the custody of the lord keeper of the privy seal. This seal is valid for the issuing of the royal treasure, or for disposing of chattels, or the contracting or discharging of a debt. It is used as a warrant for letters-patent before they pass the great seal. 3. The Signet, or Privy Signet, which is in the custody of the principal secretaries of state. Excepting that it authenticates the sign-manual, this seal seems to have no validity. For the use of all the seals the countersignature of a principal secretary of state is required by statute.

SIGNORELLI, LUCA, one of the great Italian painters before Raffaele, was born in 1441. He studied under Piero della Francesca at Florence, and soon rose to such consummate excellence as to be justly considered the forerunner of Michelangelo. He studied anatomy and the nude form with a thoroughness hardly before attained. Some fine paintings done by him in 1503 are in the cathedral of Orvieto, in which the knowledge of the human figure in action, especially as to the daring effects of what is known as "foreshortening," was such as had not hitherto been accomplished. They have been since outdone by Michelangelo, but at the time were regarded with astonishment. Signorelli was one of the artists chosen by Sixtus IV., in 1474, to decorate the walls of the famous Sistine Chapel of the Vatican; and his fresco of the "Ten Commandments" is not entirely unworthy of comparison with the unrivalled works of Michelangelo which dominate that splendid room. Except Ghirlandajo, indeed,

Signorelli must be set unhesitatingly at the head of the earlier masters in the Sistine. He died in 1523.

SIGNS, TRADESMEN'S. The signs of our taverns are the surviving relics of a custom once universal, and still very common in other countries than ours. When streets were not numbered the distinguishing mark of a sign was almost a necessity, and every tradesman sought after a quaint and easily recognizable device. In Elizabethan times the trade of the sign painter was a flourishing one, and the engravers also were not idle, for most tradesmen loved to see their signs engraved at the head of their bills. Apprentices who left their master quartered their new sign upon his old one in true heraldic fashion, to show their descent in trade. The signs were painted on signboards, as in our day we see them outside taverns, and were put up on posts at the outer edge of the path, or were slung from a beam extended across the street when the street was narrow enough, or hung from a bracket or corbel projecting from the front of the house itself. In the latter case elaborate iron wrought and beaten brackets were often used. Barbers, mercers, hatters, and shoemakers slung out a pole from which dangled emblems of their craft or specimens of their goods. The ponderous signs, swinging in their frames, grew dangerous as they grew old, for their hinges grew rusty, and made the night hideous with their rattling and shrieking, while by day light and air were impeded in the narrow lanes, or snow and rain collected to drip upon the wayfarers beneath. Every now and then there would be an accident by the falling of one of these signs; and in fine, they became such a common nuisance that in 1762 Parliament ordered them all to be removed, except such as were affixed flat to the fronts of the houses. Their size and number had at last defeated their own object, that of insuring publicity, for each one blocked out the other, and made of the streets a mere maze without a clue. As Gay says in his "Trivia"—

"Oft the peasant with inquiring face,
Bewildered trudges on from place to place;
He dwells on every sign with stupid gaze,
Enters the narrow alley's doubtful maze,
Tries every winding court and street in vain,
And doubles o'er his weary steps again."

The signs of taverns almost alone remain of all this great company. The great Southwark Inns, the "Bear at the Bridge foot," the "Tabard" of Chaucer; the Cheapside taverns, the "Mermaid," dear to Shakspeare and Ben Jonson (standing behind the houses between Bread Street and Friday Street), and the "Mitre" close by; the St. Paul's taverns, chief of which was (and is) the "Goose and Girdron," a vile caricature replacing the true sign, a swan and a lyre, emblems of Apollo, patron god of the musicians who have always frequented the famous house; the Fleet Street coffee-houses—the "Rainbow," oldest of all; the "Mitre" tavern, removed here after the fire of London had burned down the Cheapside house; the old "Cock," dear to Tennyson; and the "Devil," beloved of Ben Jonson, who, as Aubrey tells us, "to be near the 'Devil' Tavern lived without Temple Bar at a comb-maker's shop," and founded the famous Apollo club out of the wits of the city "Mermaid"—all of these, and many other signs, are part of our English literature, and stand for a thousand precious memories with us.

The curious perversion whereby the proud *palle*, or three golden balls of the Medici, rulers of Florence, once the favourite sign for a goldsmith, has come through the successive grades of banker and moneylender, to serve as the sign of the plain pawnbroker, gives room for moralizing.

Many of the old tavern signs have suffered as great a change, but in their case the change is verbal. The "Goat and Compasses" and the "Three Compasses" are pious Puritan signs, namely, "God encompasseth us" and the "Three

encompassers." The "Devil and Bag o' Nails" stands for a "Satyr and Bacchanals." The "Cat and Fiddle" was meant originally to commemorate "Caton fiddle," in memory of Caton the faithful governor of Calais. The "Swan with Three Necks" should be properly the "Swan with Three Nicks," the mark of ownership of one of the owners of the Thames swans, which were all marked on the bill in this manner. The "Bull and Mouth" was originally the "Bonlogne Mouth," or as we should say "Bonlogne Harbour," a favourite sign after the capture of that place in 1544. The original sign of all vintners was a bush, usually an ivy bush, slung out at the end of a pole. Hence the proverb "Good wine needs no bush" (*i.e.* announces itself without advertisement). In Dekker's "Wonderful Year" (1603) we read:—"Spied a bush at the end of a pole, the ancient badge of a country ale-house." Ivy was probably chosen because it kept green for a long time.

The familiar striped pole and brass cups of the barber's sign arose thus:—To accelerate the flow of blood the patient generally grasped a pole in days when barbers were the great phlebotomists; and the pole was therefore thrust out of the shop as a sign. The colour of the pole was naturally blood red, and round it was wound a strip of the white lint used to bind up the patient's arm after the operation. The brass soap-basin, with a nick out of the rim, where it fitted the throat during shaving, was hung from the bleeding-pole; and as this was a huge affair, small effigies of basins later on took its place.

SIG'URD. See SIGGRIED.

SIKHS and SIKH WARS. See the article INDIA (Historical section).

SILBERGROSCHEN, a silver coin of the old Prussian and North German currency, now replaced by the new Reichs-mark system. The silbergroschen was the thirtieth part of the thaler, and the 5-silbergroschen piece was popularly held as worth 6*d.*, the thaler being taken as worth 3*s.* This is very nearly true, as the mint par value of the thaler really was 2*s.* 11*d.* Silbergroschen are now taken as tenths of the Reichs-mark in the new coinage; that is, one silbergroschen ranks as worth 10 pfennigs.

SIL'CHESTER, a parish in the county of Hampshire, on the borders of Berks, 6½ miles west of Basingstoke, and 2½ from Mortimer station, contains now only 180 inhabitants, but occupies the site of the ancient *Segontiacum*, where Constantine was invested with the purple in 307. This city was destroyed by Ella and the South Saxons in 493. The remains consist of the amphitheatre and walls. The amphitheatre, next to Dorchester, is the largest in the kingdom. Extensive excavations have been made, though, as the soil was replaced after the search, there is little to tell of the ruined city underneath. The walls enclose an area a mile and a half in circumference, at present occupied by a farm and ploughed fields.

SILENE is the name of an extensive genus of plants belonging to the order CARYOPHYLLACEÆ, and to the tribe Sileneæ, distinguished by having the sepals united, the stamens ten, the styles three to four, and the capsule stalked, dry, opening at the top with six valves. *Silene acaulis* (cushion pink or moss campion) is a native of Europe, and is found abundantly on the Alps. It is found on nearly all the Scottish mountains, and also on Snowdon and the mountains of the north of England. It has a densely tufted stem with linear leaves, and the flowers on solitary stalks. The flowers are of a beautiful purple colour, and it forms one of the greatest ornaments of our Alpine flora. *Silene induta* (bladder campion or catch-fly) is a very common plant throughout Europe, and is met with in almost every field and wayside in Great Britain. It has been recommended for cultivation in the garden on account of its edible properties. The shoots gathered young, when about 2 inches high, and boiled, are a good

substitute for green pease or asparagus. It is a perennial herb about 2 feet high, with ovate leaves and numerous white flowers in panicles. The Sea Campion (*Silene maritima*), found near the sea in Britain, closely resembles the preceding, but has shorter stems, smaller leaves, and larger less numerous flowers. *Silene noctiflora* (night-flowering catchfly) is a native of Sweden, Germany, and Great Britain; it resembles very much the Common Red and White Campion (*Lychnis dioica*). It is not a common plant, and is remarkable for opening its flowers at night only and in warm weather, when they exhale a powerful and delicious scent. *Scene Anglica* (English catchfly), with white flowers in terminal racemes, is found in cultivated fields. *Silene Armeria*, with beautiful rose flowers, is cultivated, but is not a true native. *Silene muscipula* (Spanish or fly-trap catchfly) is a native of Spain, with intensely red petals. It is exceedingly clammy, so that when flies alight on it they are caught; and hence the name Catchfly, which is given to the whole genus, though few of the species possess the property. *Silene fruticosa* (shrubby catchfly) is frequently cultivated in gardens, and makes a handsome ornament. *Silene compacta* (close-flowered catchfly) is a native of Russia, and very nearly resembles the *Silene Armeria*. It is one of the most beautiful of the genus, and deserves a place in every collection of flowers.

SILENUS, the Latin name for the Greek deity *Silēnos*, son of Pan and Gaia. He was a twister and prophet, the instructor of Bacchus, of the family of Satyrs, whom he resembled very much in appearance and habits. He is represented as an old man, bald, with a beard and depressed nose, sometimes with a tail, at times holding the infant Bacchus in his arms, or with a vine-skin on his shoulders. He has a conspicuous place in the Bacchic chorus, and occurs in various combinations with fauns and nymphs. He is nearly always astride of something, an ass, or a turtle, &c., for he is supposed to be always unable to stand, being perpetually drunk. Yet his gift of prophecy was held to be particularly great, and his philosophic indifference to fortune was proverbial. He was devotedly fond of music, and the invention of the flute was ascribed to him.

SILESIA, a province of Prussia (conquered from Austria by Frederick the Great, in 1742) is bounded N.W. by Brandenburg, N.E. by Posen, E. by Poland, S.E. by Galicia and Galicia, and S. by Austrian Silesia and Bohemia. It is 210 m. in length from N.W. to S.E., with a breadth of 70 to 80 miles. The area is 15,695 English square miles, and the population in 1881 was 4,097,925. The river Oder, which becomes navigable soon after entering the Prussian boundary, divides the province in its whole length into two nearly equal parts, which are very different from each other. The territory on the left bank is mountainous, but has a very fertile soil; that on the right is mostly a sterile range of mountains, sandy and unproductive. There are, however, some sandy tracts on the German side, and some rich and productive spots on the Polish side. The surface slopes from south-east to north-west.

Where the frontiers of Silesia and Bohemia meet, a mountainous range, which extends southwards to the sources of the Bóhva and the Ostrowitz; it there joins the Carpathians down to the basin of the Oder on the one side from those of the Elbe and Danube on the other, and forms the natural boundary between Silesia, Bohemia, and Moravia. This mountain range, called the Sudetic chain, is divided into parts, bearing different names, the loftiest and widest peak being the Schneekoppe, which is 4950 feet above the level of the sea. In the interior there are some ranges unconnected with the great chain. The principal feeders of the Oder that drain the province are the Elbo, the Klodnitz, the Słober, and the Bartsch, on the right bank; the Oppa, the two Neisses, the Ohlan, the

Katzbach, and the Bober, on the left. There are few lakes, and those which are so called are rather large ponds. The air on the whole is mild, except in the mountainous tracts; but when the southern frontier is approached, the temperature becomes lower, and the winter longer and more severe.

Natural and Industrial Resources.—The province contains some extensive forests. The animals include horses, horned cattle, sheep (which are kept in large numbers, and from which excellent wool is obtained), goats, swine, game, fish, bees, and domestic poultry; wolves, otters, and beavers. The vegetable products are corn, pulse, potatoes, garden vegetables, fruit, flax, and hemp (in very large quantities), tobacco, beet-root, oil plants, and other yielding dye-stuffs, hops, madder, wood, teazel, and timber. The minerals are very valuable, and include copper, lead, cobalt, arsenic, iron, zinc, sulphur, marble, alum, lime, and coal. Iron, copper, lead, zinc, and coal are the chief, the latter being found in abundance. Small quantities of gold and silver have also been discovered.

The chief industries are the manufactures of lace and linen, woollens, cotton, silk, paper, iron, leather, glass, and earthenware. There are sugar refineries in several places, and breweries and brandy distilleries in most of the towns. The principal foreign trade is in linen and wool. The Oder affords abundant water communication, and the province is also traversed by the railways to and from Berlin, Posen, Vienna, &c. There is a university at Breslau, and gymnasia and professional and industrial schools in all the towns.

Silesia is the largest and most populous province in Prussia. It is divided into the three governments of Breslau, Oppeln, and Liegnitz.

SILESIA, AUSTRIAN, an Austrian province, is bounded N. by Prussian Silesia, E. by Galicia, S. by Hungary and Moravia, and W. by Moravia and Prussian Silesia. The area is 1980 square miles, and the population in 1881 was 565,475. See MORAVIA.

SIL'HOUETTE, a name frequently applied to the black profile portraits commonly known simply as *profiles*. This simple class of pictorial representations was probably suggested by the shadow thrown upon a wall. The appellation "Silhouette" is derived from Etienne de Silhouette, French minister of finance in 1759. It appears that several parsimonious fashions introduced during his administration, in order by severe economy to remedy the evils of a war that had just terminated, were called after him, *à la Silhouette*, and profiles made by tracing the shadow projected by the light of a candle on a sheet of white paper being then much in vogue, received this humorous designation. Silhouettes are executed in various ways. One of the simplest is that of tracing the outlines of a shadow thrown on a sheet of paper, and then reducing them to the required size, either by the eye or by means of a pantograph. Another mode is tracing the outline upon a glass supported in a suitable position, and either coated with a solution of gum-arabic in water, in order to enable a lead pencil to mark upon it, or covered with a sheet of very thin tracing-paper. The camera-obscura and camera-lucida are also occasionally used for the purpose. Some of the best profilists greatly improve the appearance of their silhouettes by adding in white the principal markings of the hair and drapery, which, if judiciously done, has a very good effect.

SILICA or SILICIC ACID is the oxide of silicon (SiO_2). It is largely distributed throughout the mineral kingdom in the pure state and in combination with metals as silicates. It is found almost pure in quartz, flint, jasper, and opal. By heating quartz or flint to redness and quenching in water it is obtained as a pure white powder. It may also be made by fusing flint with sodium carbonate, dissolving the product in water and precipitating the solu-

tion by hydrochloric acid. In the crystalline form of quartz it is very hard, and capable of scratching glass; it then has a specific gravity of 2.6. It melts only in the flame of the oxyhydrogen blowpipe, forming a clear glass. It is very insoluble in water and acids, but it is soluble in caustic alkalis. The solutions yield a gelatinous hydrate of silica on precipitation by hydrochloric acid. By dialysis a solution of this hydrate in water may be obtained containing 5 per cent. of silica. The metallic silicates are abundant, and form a large portion of the earth's crust, and, with the exception of the alkaline silicates, are all insoluble in water, but after fusion with caustic alkalis or alkaline carbonates all silicates are soluble in dilute hydrochloric acid.

The silicates of potassium and sodium are very similar, and are manufactured on a large scale by fusing flint or sand with potassium or sodium carbonates, or by boiling under pressure with caustic potash or soda. Both compounds form a clear glass, having the respective formula $K_2O \cdot SiO_2$ and $Na_2O \cdot SiO_2$. Both are deliquescent and soluble in water, and the solutions are known as water glass. This solution is decomposed by carbonic acid, silica being precipitated. These alkaline silicates form hard compounds with limestones, and are much used for the hardening of building stones and preventing decay and the action of the weather. The coating becomes insoluble by the carbonic acid of the air precipitating the silica; or the wall may be washed after treatment by the silicate with calcium chloride, which precipitates insoluble calcium silicate in the pores of the stone. It is also used in a kind of fresco painting called *stereochromy*, in which the colours employed are mixed with the silicate solution and applied as in oil painting. Another large outlet for water glass is in the manufacture of silicated soaps. These soaps can be made very cheaply and possess powerful detergent properties. Water glass is also employed in mordanting calico and in the manufacture of artificial stone.

Silicate of calcium ($2CaO \cdot SiO_2$) is the essential constituent of hydraulic mortars which set under water. Other cements are generally mixtures of clay or silicate of aluminium and silicate of calcium.

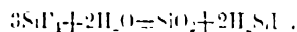
Silicic acid forms several silicic ethers. Tetraethyl silicate, $(C_2H_5)_4SiO_4$, is a colourless ethereal liquid having a specific gravity of 0.933. It boils at $165^\circ C$. (329° Fahr.), and burns with a white smoky flame, depositing silica. It is insoluble in water. Diethyl silicate, $(C_2H_5)_2SiO_2$, is also a colourless liquid, having a specific gravity of 1.079, and boiling at $350^\circ C$. (662° Fahr.) It is decomposed by water with separation of silica in the form of a transparent glass, which becomes as hard as quartz.

SILICIOUS DEPOSITS, in geology, are sedimentary formations usually consisting of grains of quartz more or less firmly cemented together, but occasionally composed almost entirely of the remains of plants and animals. The former deposits have already been noticed under SANDSTONE and QUARTZITE, and are easily distinguished from other rocks in the field by the readiness with which they scratch glass. The accumulations due to organic agency are rarely of any great extent, and consist either of the frustules of DIATOMS or the flinty shells of polycistins. To the former class belong the well-known polishing powder, TRIPOLI, which is now extensively worked in Bohemia, and the *Berg-mehl* (or "mountain meal") of Scandinavia, with which the peasants are said to adulterate their bread; and in the latter category is placed the *Barbadoes' earth* of the West Indies, so familiar to all microscopists for the beauty of its constituent organisms. FLINT and CHERT are also silicious deposits resulting from the accumulation of animal remains, being largely composed of sponge-spicules, but these only occur in thin nodular layers.

SILICON. This element is not found native in the free state, although it is most abundant, in combination

with oxygen, in the form of silica. It is obtained pure by the action of reducing agents on the chloride or fluoride of silicon. Berzelius first obtained it in 1823 by heating silico-fluoride of potassium with potassium. Like boron, it exists in three states, amorphous, graphitoid, and crystalline. Amorphous silicon is a brown heavy powder, insoluble in water; it is also insoluble in nitric and sulphuric acids, but very soluble in hydrofluoric acid and in caustic potash. It fuses at a very high temperature. In oxygen gas it burns with a brilliant flame, and forms silica. When strongly heated it assumes the graphitoid form, becoming denser and less oxidizable. This form may also be obtained by fusing silico-fluoride of potassium with aluminium. The specific gravity is 2.49, or nearly that of quartz. It may be heated in oxygen gas without change. In dry chlorine, however, it burns completely, forming chloride of silicon. Fused silicon becomes crystalline, congealing in double six-sided pyramidal crystals, and sometimes it separates from aluminium in large needles, having an iron-gray colour, with reddish iridescence. These are very hard and cut glass, and are not altered by exposure to the air. The atomic weight of silicon is 28; the symbol is Si. Chloride of silicon ($SiCl_4$) is a colourless liquid, having the specific gravity of 1.5237. It boils at $50^\circ C$. (122° Fahr.), and congeals at $-20^\circ C$. (-6° Fahr.). It is decomposed by water into hydrochloric acid and silica. Bromide of silicon ($SiBr_4$) is also a colourless liquid, having the specific gravity of 2.813. It boils at $153^\circ C$. (307° Fahr.), and congeals at $12^\circ C$. (54° Fahr.). Water decomposes it into hydrobromic acid and silica.

Fluoride of silicon (SiF_4) is a colourless gas. This singular compound is always formed when hydrofluoric acid acts on any substance containing silica, even soves to distinguish these from all others. It has a specific gravity of 3.06, and is very pungent and suffocating. It liquefies under pressure, and congeals at a very low temperature. It does not support combustion, and is unflammable. It fumes strongly in the air, and when passed into water forms silica and silico-fluoric acid according to the following reaction:—



Silico-fluoric acid can also be obtained by dissolving silica in hydrofluoric acid. It is an acid fuming liquid which does not attack glass. It forms a number of crystalline salts called silico-fluorides, having the general formula $2MF_6 \cdot SiF_6$. The silico-fluoride of potassium ($2KSiF_6$) is the least soluble of the potash salts, and the acid is sometimes employed as a reagent for separating potassium. It requires 833 parts of water for solution, and is quite insoluble in alcohol.

Silicon forms a gaseous compound with hydrogen known as hydride of silicon or silicuretted hydrogen (SiH_4). It has not been obtained in the pure state, but only mixed with hydrogen. It is spontaneously inflammable, burning with a brilliant white flame and slight explosion, forming silica in beautiful rings of white smoke. It precipitates copper and silver from solution as silicides. All silicates or compounds containing silicon may be recognized by the evolution of fluoride of silicon when heated with fluorospar and oil of vitriol in a platinum dish, the gas depositing on silica on any moistened surface. Silicates are also known by forming a soluble glass when fused with caustic alkalis or alkaline carbonates, the solution of which, when treated with hydrochloric acid, precipitates gelatinous hydrate of silica.

SILIQUA is the name given by botanists to the fruit characteristic of the order CRUCIFERÆ. The silqua is a long pod opening by two valves, which, when ripe, separate from the base upwards, leaving a central frame (*replum*), to which the seeds remain attached; the replum is regarded as a false septum, extending across from the middle line of

the two parietal placentas. A silicula is merely a short and broad siliqua.

SILISTRIA or **DRYSTRA**, a town of Bulgaria, 155 miles N.W. from Constantinople, on the right bank of the Danube. The town is large, and had formerly strong fortifications, but by the treaty of Berlin, 1878, it was dismantled. The city itself is ill built; the streets are narrow and crooked, and the houses low, and generally built of wood. The mosques and public baths are mean erections, but at the eastern extremity there is a custom-house in a better style of architecture. The large magazines which surround it contain chiefly corn and flour. The population amounts to about 20,000, who carry on a considerable trade in wood and cattle. In 1854 it was chosen as the place at which the Russians should attempt to cross the Danube, but they were driven back with heavy loss.

SILIUS ITALICUS, CAIUS, a Latin poet of the era immediately following the Augustan age, was born about 25 A.D. He was consul in the year of Nero's fall, and was friendly with Vitellius, who was emperor for a short time. He served with distinction as proconsul of Asia, and had won renown as an advocate. He modelled himself slavishly on Cicero and Virgil, whom he admired to the point of always living in the houses they had once occupied. The chief poem of Silius has remained to us entire. It is on the great Carthaginian or Second Punic War, is called "Punica," is a versification of Livy in seventeen dactylic books, and would gladly be spared for a single ode of Horace or a pastoral of Virgil, to say nothing of a chapter of the lost books of Tacitus. Silius fell ill in his old age of an incurable disease, and destroyed himself in what was then considered a very noble manner, namely, by voluntary starvation. He was 75 years old. The best edition of Silius Italicus is by Ruperth (Göttingen, 1795).

SILK. The manner in which raw silk is produced, with an account of the silk-producing insects, will be found under **SILKWORM**, and a notice of one important branch of silk manufacture is given under **RIMOSX**. The manufacture of silk undoubtedly originated in China, and according to the Chinese historians the first to unwind the silkworms' cocoon was the wife of the Emperor Hwang-ti, who flourished about 2600 B.C. Silk certainly was manufactured there at an exceedingly remote period, and although the Chinese strove zealously to retain their monopoly the cultivation of silk had been extended to Corea and Japan some centuries before the Christian era, and somewhat later, but yet before the time of Christ, it had reached Northern India. Aristotle is the first European author who refers to silk, and he states that at the period in which he wrote silk fabrics were woven in the island of Cos, but the fibre employed there appears to have been imported from China. Silk culture moved westward but slowly; but in the beginning of the fifth century A.D. it was carried on in Khotan, whence it travelled to other Central Asiatic regions, and by the sixth century it had become firmly established in Persia. Until the sixth century it was not known in Europe from what source silk was obtained, but about 552 the obscurity which enveloped this subject was cleared up by the successful result of a journey made by two Nestorian monks to China to unravel the mystery. These monks brought back some of the grains or eggs of the insect concealed in a hollow cane, fresh supplies being afterwards obtained, and the cultivation of the white mulberry commenced soon after. From Constantinople, where the worms were first reared, the silk manufacture made rapid progress among the Greeks of the Lower Empire, important centres being established at Thebes, Corinth, and Argos. In the twelfth century many of the silk workers of Greece were taken prisoners by Roger, king of Sicily, and carried to Palermo, and the industry soon afterwards spread into Italy, Venice, Milan, Florence, and Lucca, being distinguished for the excellence

of their fabrics. The Moors at an early period introduced the manufacture of silk into Spain, and a flourishing trade was already established at Granada, when that city was captured by Ferdinand the Catholic. The manufacture was introduced into France in 1480, but it did not become a success until about 1564, when the white mulberry had been grown at Nîmes to afford suitable food for the worms. The silk manufacture subsequently developed rapidly in the south of France, and England began thence to import silk fabrics, such as had been previously imported from Italy and China. James I. was extremely solicitous to promote the breeding and rearing of silkworms in England and America, forwarding himself a supply of eggs to Virginia; but the attempts failed partly from the unfitness of the climate, and partly from the habits of the people, which rendered it very difficult to secure the careful supervision necessary. In France, on the other hand, the production of silk in the neighbourhood of Lyons was turned to full account by the good taste of French workmen in all matters of design, and that city has now become in the silk trade what Manchester is in cotton. The conclusive proof of the pre-eminence to which Lyons had attained was afforded when it ceased to be dependent upon the London market for its Asiatic supplies. For a while the prosperity of the industry continued to increase, the demand for the beautiful products of the Lyons looms appearing to be illimitable, and year after year new capital was invested in the industry, and new factories were built. About the year 1842 there appeared in France, however, a disease among the silkworms, which gradually spread until it obtained the dimensions of a national calamity. From France the disease extended eastward until it ultimately reached as far as China, the eggs for incubation having to be imported from countries more and more remote, until at last Japan was the only region left from which healthy eggs could be obtained. In consequence the exportation from the latter country assumed very considerable dimensions, and in 1868 not less than 2,800,000 ounces of eggs were sent to Europe alone. By the importation of sound eggs the ravages of the silkworm disease have been mitigated in Europe, and in recent years much attention has been given to the silk produced by a variety of moths other than the *Bombyx mori*, in some instances with very satisfactory results. [See **SILKWORM**.] Among the latter materials the most important is the silk produced by the common Tussah, Tusser, or Tasar moth, which produces in the jungles throughout the whole of India a large, firm, gray coloured cocoon, from which a peculiarly strong fibre is obtained. The produce of Tussah silk had hitherto been hindered in Europe owing to the coarse nature and unequal texture of the fabrics made, which was caused by the imperfect nature of the native processes of reeling and spinning, and the difficulty of getting it to dye properly. Both these difficulties, however, were overcome by the unremitting labours of Mr. Thomas Wardle of Leek in Staffordshire, who succeeded in getting the Indian cocoons reeled by the Italian system, with the result of obtaining a beautifully fine and even thread, and whose experiments in dyeing resulted in the production of all the most artistic plain shades of colour in great purity and delicacy, together with the introduction of a completely new mode of decoration by printing on the silk in colours from native Indian designs. Of other silks brought into competition with that of the *Bombyx mori* the most important are those of the *Bombyx Pernyi*, found and reeled only in North China; the *Bombyx Cynthia*, used in China and some other parts of North Asia; the *Bombyx Yama Mai*, which is highly esteemed in Japan; the *Bombyx ricini* of Bengal, a species which feeds on the leaves of the castor-oil plant, and the *Telea polyphemus*, a silk moth found in America. Silk has also been obtained from spiders, but never in sufficient quantities to reach any commercial importance. The byssus of the *Pinna nobilis*, a shell-fish inhabiting the

Mediterranean, consists of long silken filaments, and these have been woven into fabrics possessing much strength and beauty, but the manufacture has been rather for curiosity than use.

Silk Manufacture.—The cocoons consist of the sheath of loose filaments attached to the twigs that support the whole, and beneath this the external coat of soft flossy silk, within which is the compact oval ball which forms the cocoon proper. The thread which forms the cocoon is produced through two orifices in the nose of the worm, and the two fibres on issuing forth are secured together by the glutinous matter which accompanies them and forms about a quarter of their weight. Unlike all other threads used for textile fabrics which are found in short lengths, the silk fibre is produced in one unbroken thread of indefinite extension, hence the processes employed in its preparation are peculiar to itself. The operation of reeling is conducted in establishments termed “filatures,” and the process, though it calls for the exercise of great skill and judgment on the part of the operative, is yet in all its essentials extremely simple. The cocoons, divested of their outer flossy covering, are placed four or five together in each one of four compartments, in a sort of trough or basin holding hot water, which is kept at the necessary temperature by a steam pipe. This hot water softens the gummy casing of the cocoons and releases the ends of the fibres, which are caught up by a kind of small broom with which the cocoons are stirred, and those from each compartment being brought together they are passed through a guide hole, which strips off a portion of the gum, and enables them to be twisted together into a single strand. A corresponding number of similar filaments pass through a neighbouring guide hole, and the strands from the two are carried forward for a space twisted together, and are then made to diverge and pass through separate holes, then again united and twisted together with a similar pair which have been advancing by a similar road from the basin, and the whole four, after being once more separated, are finally intertwisted as one and wound upon the reel. The object of this repeated intertwisting and separating is to obtain one smooth round thread. When a thread breaks or a cocoon gives out, a fresh cocoon is substituted, and as the inner fibres are always much finer than the outer, the operative has to exercise considerable judgment to maintain a uniform thickness in the thread. The reel upon which the final strand is wound is set at some distance from the trough to allow the gum to harden, and it has a slight lateral motion, so that the threads are laid in spirals and do not come in contact while fresh from the bath. The finer filaments found towards the end of the cocoons are known as reeler's waste, and together with the floss, pierced cocoons, &c., form the *spun* or *waste* silk, which is dressed, combed, roved, and spun by processes and on machinery similar to that used in the alpaca or worsted wool manufactures. The raw silk taken off from the reels is in China made up into bundles, called books, for exportation, and elsewhere the hanks are simply twisted so as to hold conveniently together. They are then ready for the factory of the silk throwsters, where are conducted the operations connected with the throwing, a term variously used to express the putting a twist into fibres. Of the processes comprehended under this term the first is winding, which is done from light six-sided reels called swifts, upon which the hanks, first washed in hot water with soap and soda, are extended, and rows of which are set upon long shafts in an iron frame, and connected each with its own bobbin upon the top of the frame. The revolution of the latter carries around the reel beneath, and the movement is properly checked and regulated by appliances to the reel. The silk is next cleaned by conducting the thread through an adjustable opening between two upright blades of an instrument called the cleaner, and thence to empty bobbins,

which by their revolutions wind it off from the full ones. Knots and other irregularities which reach the cleaner throw the machine out of gear, and stop the movement of the bobbin until the obstruction is removed. For some purposes the only preparation required to prepare the thread is the winding and cleaning; but usually the cleaning is followed by doubling, or bringing together side by side two threads from separate bobbins, and winding them without any twist upon a single bobbin. The amount of twist necessary to give strength and uniformity to the thread is given by a separate process, and according to the method and amount of twist given the silk assumes the forms known as singles, tram, and organzine, in which it reaches the weaver. *Singles* simply consist of the single filament of raw silk, either untwisted as it is delivered by the reeler, or only sufficiently twisted to enable it to bear the operations of boiling and dyeing, through which it passes before weaving. *Tram* consists of silk that is doubled before being slightly twisted together, and is used for the wool or shoot of gros-de-Naples, velvets, and flowered silks. *Organzine* is prepared by twisting each strand before doubling as well as afterwards, a strong thread suitable for warp being prepared by these means. The twisting process is conducted by machines similar to those used for the same purpose in cotton spinning. When the silk leaves the throwster it has a somewhat hard and wiry appearance owing to the gum which has been retained, and before the silk is dyed it is subjected to a process of boiling in a solution of soap and soda, after which it is rinsed perfectly free in cold water. It loses about one-quarter its weight by this operation, but recovers nearly half the loss in the dye stuff it absorbs. The latter is the gain in what may be termed honest dyeing, but sometimes methods of dyeing are resorted to by which the silk is caused to take up a heavy weight of the dyestuff, and so present for a short time a rich heavy appearance, which soon disappears when the material is worn. In plain silk weaving the process is much the same as in weaving woollen or linen, but the weaver is assisted by a machine for the even distribution of the warp, which frequently consists of 8000 separate threads in a breadth of 20 inches. The Jacquard loom, invented by a weaver of Lyons [see JACQUARD], was the means of facilitating and cheapening the production of fancy or figured silks to an extraordinary extent. Patterns which required the greatest degree of skill and the most painful labour by the earlier process were produced by this machine by weavers of ordinary skill, and with but little more labour than that required in weaving plain silks. It is still largely employed, though during recent years several improved looms for silk weaving have been introduced. The power-loom has not been universally employed in the silk manufacture, and excepting for common goods, it does not possess any great advantage over the hand-loom, as the delicacy of the material to be worked, and the attention which must be given to the process of the weft, cause frequent stoppages. Brocade and damask are now comparatively but little used. Persian, sarsuet, gros-de-Naples, dupeies, satin, and levantines are the names given to plain silks, which vary from one another only in texture, quality, or softness. Satin derives its lustre from the great proportion of the threads of the warp being left visible, and the piece being afterwards passed over heated cylinders. Other varieties of silk goods are produced by mechanical arrangements in the loom, such as using different shuttles with threads of various substances, &c. The pile which constitutes the peculiarity of velvet is produced by the insertion of short pieces of silk thread, which cover the surface so entirely as to conceal the interlacings of the warp and weft. The process of weaving velvet is slow and costly. There are several sorts of goods in which silk is employed with woollen materials, as poplins and bombazines.

The silk manufacture, after its introduction into England in the fifteenth century, remained for a long period one of the least important branches of the national industry. After the revocation of the Edict of Nantes, in 1685, about 50,000 refugees fled to England, a large proportion of whom settled in Spitalfields, and carried on the silk manufacture. In 1692 the refugees obtained an exclusive patent for certain articles.

In 1711 a considerable impetus was given to the silk trade by the erection of a mill at Derby by Sir Thomas Lombe, a London merchant. The trade gradually extended, Manchester, Coventry, and Macclesfield acquiring celebrity in connection with it. Since 1860 the silk manufacture has been declining in England, owing chiefly to foreign competition. In the palmy days of the trade 60,000 persons were engaged in it in London, and 10,000 in Coventry, but now there are not more than 4000 in London and 10,000 in Coventry. Macclesfield has suffered in almost similar proportion. In 1860 about 9,000,000 lbs. of raw silk were imported, whereas in 1886 the quantity was only 2,000,000. On the other hand, the imports of silk manufactures in 1860 only amounted to £3,350,000, whereas in 1886 they reached £10,561,933. What remains to us of the silk manufacture is owing mainly to Mr. S. C. Lester, of Bradford, whose success in utilizing *waste silk* has been so remarkable. One result of this gentleman's enterprise has been to draw the industry to Yorkshire from the midland and southern counties of England.

The following are the official returns relating to the silk factories in the year 1886:—

	1851	1868	1874	1885
No. of factories,	400	501	818	691
" throwing spindles, . .	1,097,750	978,168	1,114,703	888,104
" drawing spindles, . .	—	181,538	221,708	174,644
" power-loom,	9290	110,255	10,002	11,969
Children employed,	8,087	1,885	6,871	3,195
Employes—Males,	16,890	12,177	13,171	13,119
" Females,	3,023	28,840	32,388	29,885
" Total,	50,157	41,917	45,559	42,995

The imports of raw silk into the United Kingdom—chiefly from China, India, and Egypt—have been as follows in recent years:—

	1884	1885	1886
Value,	£3,341,576	1,464,914	1,530,927

The value of the silk manufactures—chiefly from France and Belgium—imported during the same period was:—

	1884	1885	1886
Raw silk,	£3,285,518	£3,706,314	£5,504,419
Ribbons, silk or satin, . .	1,817,463	2,176,321	2,159,989
Ribbons, other kinds, . .	1,28,132	89,513	121,489
Other sorts of silk, . .	—	—	—
Total,	2,715,763	2,465,722	2,867,825

The exports of raw silk in 1886 were valued at £492,700; of thrown, twist, &c. yarn, £136,178; and of silk manufactures, £1,116,910.

SILK-COTTON. *S. C. BOMBAY.*

SILK WORM is the name given to the larvae of several species of *Morus* belonging to the family *Bombycidae*, from their habit of spinning cocoons of fine threads, out of which the silk of commerce is manufactured. The best known species is the Mulberry Silkworm Moth (*Bombyx mori*). This species has a short, thick, hairy body, and measures about 2 inches across the wings, which are large and broad; the proboscis is very short and rudimentary, and the antennae are pectinated. The wings are of a creamy colour, with distinct dusky transverse lines. The perfect insect lives a very short time, and takes little or no food; the female

in the domesticated state is quite incapable of flight, and generally dies very soon after laying her eggs. The silkworm was originally a native of China, where the cultivation of silk is said to date from 2640 B.C. The eggs were introduced into Europe in the reign of Justinian, and the species has become naturalized in many parts of Southern Europe, where silkworm rearing was for long a profitable industry, though of late years it has been declining. In England the silkworm is usually only reared as a curiosity. The eggs are numerous, fastened to the surface on which they are laid by a gummy secretion, which, when dry, become silky. In this country the eggs of this moth are hatched early in May. The caterpillar or silkworm is at first of a dark colour, but soon becomes light, and in its tints much resembles the perfect insect—a circumstance common in caterpillars. The silkworm is at first very small, but grows rapidly till, when full grown, it is about 3 inches long. It has a large head and a horn on the last segment but one. Its proper food is the white mulberry, though it will likewise eat the lettuce and some few other plants; on these plants, however, it does not thrive equally well, and the silk yielded is of a poor quality.

The silkworm is about eight weeks in arriving at maturity, during which period it changes its skin four or five times. When about to cast its skin it ceases to eat, raises the fore part of the body slightly, and remains in perfect repose. In this state it is necessary that it should continue for some little time, in order that the new skin, which is at this time forming, may become sufficiently mature to enable the caterpillar to burst through the old one. This operation, which is apparently one of considerable difficulty, is performed thus:—The fore part of the old skin is burst; the silkworm then, by continually writhing its body (but not moving from the spot), contrives to thrust the skin back to the tail, and ultimately to disengage itself altogether: this last part of the operation, however, is the most difficult, since it is no uncommon occurrence for them to die from not being able to disengage the last segment of the body from the old skin.

When full grown the silkworm commences spinning its web in some convenient spot; and as it does not change the position of the hinder portion of its body much, but continues drawing its thread from various points and attaching it to others, it follows that after a time its body becomes in a great measure inclosed by the thread. The work is then continued from one thread to another, the silkworm moving its head and spinning in a zigzag way, bending the fore part of the body back to spin in all directions within reach, and shifting the body only to cover with silk the part which was beneath it. As the silkworm spins its web by thus bending the fore part of the body back, and moves the hinder part of the body in such a way only as to enable it to reach the further back with the fore part, it follows that it incloses itself in a cocoon much shorter than its own body, for soon after the beginning the whole is continued with the body in a bent position.

During the time of spinning the cocoon the silkworm decreases in length very considerably, and after it is completed it is not half its original length; at this time it becomes quite torpid, soon changes its skin, and appears in the form of a chrysalis. The time required to complete the cocoon is about five days. In the chrysalis state the animal remains from a fortnight to three weeks; it then bursts its case and comes forth in the imago state, the moth having previously dissolved a portion of the cocoon by means of a fluid which it ejects. When the cocoon is required for its silk it is necessary to kill the inclosed chrysalis by a gentle heat.

Silkworms are subject to various diseases, especially to that called *pebrine* or the pepper disease, in consequence of its appearance being precisely the same as if the insects had been dusted with black pepper. The blackness is due

to the presence of minute parasitic bodies in the tissues. All the worms attacked by it are sure to die of it sooner or later; even if they survive to the moth state and lay eggs, the eggs are either addled or produce infected caterpillars—for the disease is hereditary—which die before spinning. The disease first appeared at Herault and Poitiers in 1842. It subsequently visited nearly all the silk-producing countries in the world, and produced much poverty and misery. M. Pasteur, one of the ablest French chemists, thoroughly investigated the disease—which reduced the revenue from silk-culture in France from 130,000,000 francs in 1853, to only 30,000,000 francs in 1865, and the only remedy he was able to find was to exercise the greatest possible care in the selection of only healthy moths; to keep these by themselves, and from the stock of healthy eggs thus produced a healthy breed of silkworms may be and was obtained.

In spite of all the care that was exercised the disease spread to such an extent that it became necessary to procure uninfected eggs, technically called seed, from the

India, however, Tussah silk, though coarse, is a considerable article of commerce, being remarkable for its durability.

SILK-WORM GUT or FISHING GUT, a strand highly appreciated by anglers for its strength, lightness, and lustre, is obtained from the *Bombyx mori* or common silkworm caterpillar. To prepare it the worms are taken when just ready to spin, and are steeped in strong vinegar for a period varying according to the weather, and are then delicately broken in two across the middle, the glutinous secretion with which they are filled being stretched out as far as possible upon a board, and secured by slits or pegs. It is then allowed to dry in the sun or in a warm place, after which the gut is ready for use.

SIL'PHIDÆ. See CARRION BEETLES.

SILU'RES, a Celtic people of Britain, possibly aboriginal, inhabiting what we now know as South Wales. Tacitus, in the "Agricola," tells us of their shorter stature, dark complexion, and curly hair; and finding them so very different from the tall fair Celts who peopled Gaul and most of the eastward, northward, and central parts of Britain, Agricola jumped at the conclusion that they must be a colony of Iberians from Spain. Similar remnants of a short black-haired Celtic stock are found in Cornwall and Devon, in Ireland, and in the Highlands and Western Isles, and to a far less degree in England also, especially in the Midland districts round Derby, Stafford, Leicester, &c.

It seems increasingly probable that we have in these Silures, who so obstinately and successfully resisted the Roman arms, and whom the English were quite unable to cope with long on, a survival of a primitive or stone-age race inhabiting Great Britain before the arrival of the Celts, and driven by them westward, as they in their turn were driven by the Teutonic or English invasion. The Silurians must

be sharply distinguished from the Welsh proper or Cymry on this hypothesis. The remains in prehistoric barrows or tombs show that the Stone-men of our islands were somewhat like the Eskimo in appearance—short and slight, their muscles too much developed for their slender and ill-nurtured bones, the men very much superior to the women in stature and strength, indicating a hard and miserable life, where the weakest go to the wall. The face of these men was oval, and the features mild and regular, their skulls were long and narrow, marked with a prominent ridge, like the keel of a boat reversed. They were hunters, and had tame animals, goats, sheep, oxen, pigs, horses, dogs, geese, but not, as far as we yet know, chickens. Their ferocious courage we know from Romans and English alike; no disaster nor loss of leaders, as when their prince, Caradoc or Caractacus, was taken (A.D. 51), could break their obstinate spirit. Solinus, writing early in the third century, says: "A stormy sea divides the Silurian island (he means the Bristol Channel cutting off South Wales) from the region held by the Deemonian Britons. Its natives (Silures) still keep to their ancient ways. They will have no markets nor money, but give and take in kind. They are devoted to the worship of the gods (i.e. the Druid gods), and men and women alike show their skill in divination of the future."



Ailanto Silkworm Moth.

Levant, India, and Japan successively, and now the original mulberry silkworm is almost, if not quite, exterminated in Europe.

Attention has been directed of late years to other species of Bombycidae which produce silk. Of these one of the most interesting is the Ailanto Silkworm Moth (*Attacus cyathia*), which belongs to the restricted family Saturniidae. This species, originally a native of India and China, is cultivated in Japan, and has been successfully naturalized in France and other parts of the Continent. It feeds on the leaves of the *Ailanthus glandulosa*, a tree belonging to the order Simarubaceae, which is cultivated as an ornamental tree in Europe. The Ailanto Moth is a large species, measuring 5 or 6 inches across the wings. It forms a long pearly-gray cocoon, open at each end, and attached by a silk thread to a leaf. The cocoon is not very rich in silk, and for some time after its introduction into France presented great difficulties in winding. These difficulties have now been overcome, and the raw silk can be produced by the same machinery as the ordinary raw silk. This species does not require the care and expense necessary in the rearing of the mulberry moth. Tussah silk is produced by several species of the genus *Antheraea*, which ranges from Northern India through China to Japan. These species cannot be reared in the cold climate of Europe. In

The researches of antiquaries in the burial-places of these people show that at first they were alone, and that subsequently tall fair men with round skulls came on them, men who knew bronze; and the skeletons of the two races are intermixed. But the barrows containing remains of Stone-men have no bronze: that is an art only brought by the new-comers. We know nothing of the latter in Britain until they possessed bronze, but if we cross the Channel we find them ignorant of bronze, knowing stone only. These men, of a kind of Finnish type apparently, learned their grand secret before they crossed the sea. The Bronze-men and Stone-men were mixed towards the east, but the Stone-men remained almost pure in the west (South Wales and Cornwall). Then upon these two intermixed savage peoples dash the Celts, Gaels to the north and to Ireland, Cymry to the south, and completely overwhelm them, except as to the special Silurian strongholds.

The chief origin of Druidical culture is held by competent observers to lie with these aboriginal pre-Celtic dark Silurians; and further, the remarkable superstitions of Wales (SIN-LATING, for example, as described in the article on that subject) are held to have descended, no doubt with great modifications, from the same source. The like characteristics of intense superstition and curious customs mark the parts of Ireland and Scotland inhabited by similar small dark people. The *Fir-boly* of Ireland are by many antiquaries held to be of the same race with the Silures.

SILURIAN SYSTEM, in geology, an important group of rocks of great, but variable, thickness, representing one of the earliest divisions of the Palæozoic era. [See GEOLOGY.] The formation was first satisfactorily defined by Sir Roderick Murchison, who proposed the name by which it is universally known, in allusion to its typical development in the area on the borders of England and Wales, formerly inhabited by the ancient tribe of Silures. The rocks chiefly consist of grits, massive sandstones, and more or less laminated shales and mudstones, with occasional intercalated limestones; and all are truly of marine origin, though none perhaps were formed at any great depth. Fossils are abundant at almost all horizons, and by aid of these the system is readily subdivided into the following groups, which are respectively treated in the special articles:

		{ Limestones.
Upper Silurian.	LUDLOW BEDS	{ Upper Ludlow.
		{ Aymestry Limestone.
		{ Lower Ludlow.
WENLOCK BEDS	{	Wenlock Limestone.
		Wenlock Shales.
		WOOLHOPE LIMESTONE.
		TARANNOX SHALE.
Lower Silurian.	Upper LLANDOVRY BEDS.	
	{ Lower LLANDOVRY BEDS.	
	{ BALA and CARADOC BEDS.	
	{ LLANDRILLO FLINTS.	
	Ailing and STIFF-STONLS BEDS.	

There is an UNCONFORMABILITY between the two series of Llandovery Beds which makes it convenient to divide the system into an upper and lower group at this point. But it must be remembered that the foregoing classification is not adopted by all authorities, though employed by the Geological Survey, and many arrange the Bala, Caradoc, Llandeilo, Arenig, and Stiper-stones beds as a distinct ORDOVICIAN system, while others regard them as Upper CAMBRIAN.

Among the fossils, the vegetable kingdom is most imperfectly represented. A few land plants, allied to the living club-mosses, have been discovered in the uppermost strata, and other more lowly types, such as seaweeds, have frequently been recorded from lower horizons; but it is extremely probable that most of the latter are nothing more

than mineral infiltrations and tracks of marine animals. GRAPTOLITES and TRILOBITES are the most characteristic forms of life of the period, the former being confined to Silurian rocks, with the partial exception of the underlying Tremadoc slates, and the latter group attaining their maximum development in the various limestones. Remains of sponges are also occasionally met with, and innumerable corals occur in all the limestones; the Wenlock limestone, as in the neighbourhood of Dudley, is especially prolific, and large blocks consist entirely of the honeycomb coral (*Favosites*), chain-coral (*Halysites*), sun-coral (*Heliolites*), cup-coral (*Omphyma*), &c. Among shells, the Brachipoda are much more abundant than the true bivalve Mollusca, and are typically represented by *Atrypa reticularis*, *Strophomena depressa*, *Rhynchonella Wilsoni*, *Pentamerus*, *Othis*, *Spirifera*, and many others. *Avicula*, *Nucula*, and *Posidonomya* are bivalved Mollusca, and the flat coiled *Euomphalus* is a typical gastropod. Cephalopoda are represented by *Orthoceras*, *Phragmoceras*, *Lituites*, &c., and to the little pelagic Pteropoda are referred *Theca* and *Bellerophon*. Some of the limestones are made up almost entirely of the remains of *Exochinites*, and the curious allied animals known as *Blastoidea* are also well represented; star-fishes, too, are not unknown, nor are primitive types of sea-urchins. There are several sea-mats or POLYZOA (e.g., *Fenestella*), and evidence of the existence of worms consists both in their burrows and the presence of their horny jaws. But the most interesting of the invertebrate animals of the Silurian period are the insects and scorpions, which were only discovered for the first time in 1884: M. C. Brongniart has described a wing like that of a cockroach from the lower beds of Calvados, France, and a true scorpion (*Paleophonus*) has been obtained from the Upper Silurian both of Sweden, Scotland, and North America. Huge crustacea, having their nearest living representatives in the king crabs of the Moluccas, are also met with in the uppermost Silurian deposits of Scotland. The earliest undoubted remains of vertebrate animals occur in the lower Ludlow rocks, the head-shield of a fish (*Scaphaspis ludensis*) having been found by Mr. John Edward Lee near Leintwardine, and a bone-bed in the upper Ludlow yields additional evidence of fish life in the form of spines of sharks, bearing the name of *Onchus*.

The economic products of the Silurian system are but few, and not of great importance. The beds are locally worked for building stone and road metal, and flagstones and roofing-slates of a poor quality are occasionally obtained. The limestones are sometimes calcined for the manufacture of mortar, and in a few cases there are valuable metalliferous veins, yielding ores of lead, copper, silver, and gold. Some of the corresponding strata in North America are characterized by red muds containing beds of salt and gypsum, and similar formations of Lower Silurian age are also known in the Salt Range of the Punjab in India. The Silurian rocks of Scandinavia and Bohemia closely resemble, in lithological character, those of the British Isles. (See Murchison's "Siluria" and "Silurian System," and J. E. Marr's "Classification of the Cambrian and Silurian Rocks," Sedgwick prize essay, Cambridge, 1883.)

SILURIDA. See CAT-FISHES.

SILVANUS, one of the genuine indigenous Latin deities, as distinguished from the Olympian circle imported *en bloc* from Greece and worshipped rather as a matter of public ceremonial and poetic enthusiasm than by the great mass of the people, was the presiding deity of all things connected with forestry and meadow-land. Not only the trees and the grass were under his tutelary care, but flocks and herds also, and even the simpler musical efforts, so far as the lore of the shepherds pursued the art. He was the lover of Pomona the fruit-goddess, and the sacrifices he

delighted in were grapes, ears of corn, milk, and wine. The poets purposely made him practically identical now with Faunus, now with the Greek Pan, but this was merely to couple his name with their legends. The Roman simple faith loved an abstraction, not a personation; and there are no genuine legends about the "Wood Spirit" (*silva*, a wood), any more than about "Luck," "Concord," or any other of the home gods.

SILVER, a precious metal well known to the ancients, and used from the earliest times on account of its pure white colour and perfect lustre. It is found native, crystallizing in cubes or octahedrons and in laminated masses, and also minutely disseminated in other minerals. It usually contains copper or gold, and is seldom found pure. The most important ores of silver are the chloride or horn silver, and the sulphide known as silver glance. Horn silver is a gray, translucent, soft mineral, having a specific gravity of 5.552; silver glance is a dark gray, soft, metallic mass, having a specific gravity of 7.196, and containing 87 per cent. of silver. Other ores are the iodide, bromide, selenide, telluride, antimonide, arsenide, and mercuride. These ores are mostly found in gneiss, mica-schist, and clay slate, and especially in California, Nevada, and Mexico. Some copper ores contain a considerable amount of silver. Galena or lead sulphide usually contains silver varying from 2 to 100 oz. to the ton. Iron and copper pyrites often contain minute proportions of silver, and it is now generally extracted with profit from these ores by Claudet's process, which consists in precipitating it from the weak solutions by sodium iodide. Rich ores are usually smelted with litharge or lead. This method seems to have been known in very ancient times. The silver is then separated from the lead by cupellation; in this process the lead is oxidized and run off as litharge, the ingot of silver being left behind. In refining lead where the silver does not exceed 8 oz. to the ton, Pattinson's process is employed; this consists in fishing out the crystals of lead from the molten metal, which leaves the residue constantly richer in silver, until it can be used for cupellation. It is found that half an ounce of silver to the ton of lead can be thus extracted at a profit. Another method, known as Parke's process, depends on the superior attraction of zinc for silver. The silver lead is raised to the melting point of zinc, and this metal is then added; it combines with the silver, and the alloy rises to the surface and is skimmed off. The alloy is then heated in a retort, the zinc distilled off, and the silver run out into ingots. Another method of extracting silver from its ores consists in treating them with mercury; from the amalgam so formed the mercury is separated by distillation. This method is employed in California and Nevada.

Silver may be obtained pure by decomposing the moist chloride with hydrochloric acid and sheet zinc; the metal separates in a spongy form, which may be fused under sodium carbonate to prevent access of air. When pure, it will absorb twenty-two times its volume of oxygen if exposed when melted to the air, and just before the metal solidifies this gas is given off with sufficient violence to project the silver out of the crucible. A small proportion of copper prevents this action.

Silver is a pure white metal, harder than gold, but softer than copper. Its specific gravity is 10.5, which is increased to 10.57 by coinage. It crystallizes in cubes. The atomic weight is 108; the symbol is Ag. It is the best conductor of heat and electricity of all the metals. It is nearly equal to gold in malleability; it can be hammered into thin sheets not exceeding the thousandth part of an inch in thickness. It is so ductile that it may be drawn into wire of which 400 feet weigh only one grain; and its tenacity is so great that a wire $\frac{1}{16}$ of an inch in diameter will support a weight of 187 lbs. It melts at a white heat, estimated at 1000° C. (1832° Fahr.). It is not acted on by molten

caustic alkalis and alkaline nitrates, and crucibles made of this metal are much used in laboratories for fusions with these substances. It is not affected by exposure to the air unless the latter contains sulphur compounds, when it is rapidly tarnished and blackened; but it is oxidized by ozone. The discolouration of silver ornaments and dishes is due to the film of sulphide formed by impure air. It can be at once removed by potassium cyanide in solution; and it can be prevented by wrapping the articles when not in use in paper coated with white lead. In oxygen it burns with a green flame, forming the oxide. Many silver salts are blackened by exposure to light, with partial reduction of the metal, and most of these are decomposed by heat. The sensitiveness of silver salts to light forms the main basis of photographic processes, which nearly all depend on this metal. The metal is not used in manufacture in the pure state, being too soft; it is usually alloyed with a small proportion of copper, which much increases the hardness without injuring the colour, the alloy being quite white when containing as much as 50 per cent. of copper. The alloy also takes a better polish. English "standard silver" for coinage, and for utensils and ornaments, contains 7.5 per cent. of copper; the specific gravity of the alloy is 10.20.

Silver forms alloys with most of the metals; that with aluminium is used for soldering the metal. Alloys of gold and silver occur native. The alloy with 10 per cent. of nickel is used as coin in Switzerland. The alloy with 20 per cent. of tin is very white and as hard as bronze. The alloy with 20 per cent. of zinc is known as Duppel's reflector metal. Pure silver is a good deal employed for mirrors; in this case the metal is deposited on glass from solution by *pu* or some other reducing agent; it forms a brilliant reflecting surface.

There are three oxides of silver: argentous oxide or hemioxide (Ag_2O), argentic oxide or protoxide (Ag_2O), and argentic dioxide or peroxide (Ag_2O_2).

Argentous oxide is a black powder. Argentic oxide is also a black powder, which is a strong base, and combines with acids, forming the argentic salts, or the principal salts of silver. When heated it is decomposed into oxygen and metallic silver. It is easily reduced by oxidizable substances, some of which—for instance, creosote—take fire when mixed with it. This oxide is used in medicine in $\frac{1}{2}$ grain to 2 grain doses, generally in the form of pills, and great care must be taken in selecting the excipient employed, avoiding organic matters, or the pills are liable to inflammation. Ammonia converts it into FULMINATING SILVER ($\text{C}_2\text{N}_2\text{Ag}_2\text{O}_2$). Argentic dioxide is produced by the action of ozone on pulverulent silver. Peroxide of hydrogen resolves it into metallic silver and oxygen.

Silver forms two chlorides: the protochloride or argentic chloride (AgCl), and the hemichloride or argentous chloride (Ag_2Cl). The latter is formed by the action of light on the former, and is of no importance except in photography. Argentic chloride is found native as "horn silver." It is thrown down as a white curdy precipitate, when hydrochloric acid or a soluble chloride is added to any soluble silver salts, except the hyposulphite. It is very soluble in solution of hyposulphite of soda, and this solution is employed in photography to remove it. It is quite insoluble in water and acids, but soluble in ammonia; it is also soluble in alkaline chlorides, forming crystallizable double salts. It is converted into iodide and bromide of silver by digestion in solutions of potassium iodide, or bromide, and is soluble also in potassium cyanide, forming a double cyanide. It fuses at 260° C. (500° Fahr.) into a yellow liquid, congealing into a horny translucent mass on cooling. It is easily reduced by zinc in the presence of acids and by glucose in the presence of alkalis. When exposed to light it darkens to a deep violet colour. It is the chief agent employed in photographic paper for positive photographs, the chloride unacted on by light being dissolved out

by sodium hyposulphite. With ammonia it forms the ammonio-chloride of silver ($3\text{NH}_3\cdot 2\text{AgCl}$), which gives off pure ammonia gas when heated.

There are two bromides of silver, the protobromide or argentic bromide (AgBr), and the hemibromide or argentous bromide (Ag_2Br). *Argentous bromide* is found native as bromyrite or bromic silver. It is formed when a soluble bromide is added to solutions of silver, as a yellowish curdy precipitate, insoluble in water and in acids, and but sparingly soluble in ammonia; it is very soluble in alkaline bromides. Chlorine converts it into argentic chloride with evolution of bromine. It is extremely sensitive to light, being coloured violet on exposure, and is extensively employed in photography as an emulsion, with gelatin, in coating glass plates, and those known as gelatin dry plates, have an extraordinary sensitiveness to light, and are much employed in instantaneous processes. Paper coated with this emulsion is now extensively employed both for negative and for positive prints. [See PHOTOGRAPHY.] *Argentous bromide* is produced by the action of light on argentic bromide.

There is only one iodide of silver, argentic iodide (AgI). It is found native in Mexico as iodyrite, in yellow hexagonal crystals. It may be obtained by heating silver with iodine, or by acting on a solution of a silver salt by potassium iodide; it then forms a dense pale yellow precipitate, insoluble in water, in acids, and in ammonia. It is very soluble in potassium iodide, forming a double salt ($\text{AgI} \cdot 2\text{KI}$). Chlorine converts it into argentic chloride, iodine being evolved. It fuses to a dark red liquid at a red heat. Iodide of silver forms the basis of the collodion process in photography, being very sensitive to light in the presence of silver nitrate. It is formed by coating the glass with collodion containing an iodide soluble in alcohol, this is then placed in a bath of silver nitrate, and the unaltered iodide of silver is removed after development by potassium cyanide. It was also the first sensitive film used in the Daguerotype process, being deposited on a silver or silvered copper surface. In the Talbotype process the same substance was employed, deposited on paper. [See PHOTOGRAPHY.] Silver combines with fluorine, forming argentic fluoride (AgF). It crystallizes in colourless prisms, having the formula $\text{AgF} \cdot 2\text{H}_2\text{O}$. The sulphide of silver, or argentic sulphide, is found native as silver glance in cubic and octahedral crystals of a dark metallic lustre. It may be obtained by fusing silver with sulphur; it is a soft lead-gray mass, having a specific gravity of 29.85. It is used for producing black designs on silver and as a hair dye. Selenide of silver (Ag_2Se) occurs native as selenite. Telluride of silver (Ag_2Te) occurs native as telluro-silver.

Of the salts of silver, the nitrate, chloride, and acetate are soluble in water, the other salts are insoluble or nearly so. The most important salt is the nitrate (AgNO_3); this compound in the fusa form is known as lunar caustic. It crystallizes in large anhydrous, colourless, trimetric crystals; these are very soluble in water, dissolving in one part of cold, half part of hot water. It fuses at 219°C . (426°Fahr.), and is put into hard sticks for surgical use as a caustic. These are sometimes employed of mitigated strength by adding equal parts of potassium nitrate, and fusing together. It instantly destroys the vitality of flesh, and is much used as a caustic. It is also administered internally in medicinal doses of one-sixth to one-third of a grain for epilepsy. It is very poisonous, the antidote is common salt given in a demulcent drink. Salt is also used to arrest its action locally as a caustic. Organic substance, impregnated with silver nitrate become black on exposure to light, from the reduction of the silver. It is therefore used as a hair dye. In combination with gum-arabic it forms the indelible marking ink used for writing on linen. Nearly all salts of silver are soluble in nitric acid, and the solutions are known by the characteristic precipitation of white curdy

silver chloride by hydrochloric acid; the precipitate is soluble in ammonia, and becomes black on exposure to light, and is easily reduced to the metallic state by zinc. These reactions distinguish compounds of silver from those of all the other metals.

Production of Silver.—Silver is one of the most widely distributed of metals, and being often found in a native state (though never chemically pure) and easily fusible, it became known to man in very early ages. There are frequent references to its use in the Bible (from the time of Abraham downwards), and in the records of most ancient nations. Silver is obtained partly from true silver ores, partly from other ores containing it as an accidental or variable constituent. See SILVER ORES.

The silver produced in Great Britain is extracted from an argentiferous lead to the value of about £200,000 per annum. Most of the countries of Europe yield silver in moderate quantities, and some of the mines, notably those of the Schemnitz district, in Hungary, have been worked almost continuously for several hundred years. The mines of Spain furnished the main supply of the metal to Phœnicia, Carthage, and Rome, and continued to be worked into the middle ages, when their production fell off and they were mostly abandoned, and silver mining was not revived in that country until 1825. The discovery of rich mines in Almeria about 1840, and the improved means of extracting silver from the argentiferous galena of the numerous lead mines, have now raised the supply to something like £500,000 per annum. From the Spanish conquests in Mexico and South America, in the sixteenth century, until recent years, Mexico and Peru, including Potosi (now part of Bolivia), were the main sources of silver supply. The Mexican mines are scattered along the Cordilleras. The principal vein is of extraordinary thickness, often more than 150 feet across. It is said to have been traced for about 12 miles, and has in some parts been penetrated to a depth of 2000 feet. Silver mining in the United States practically dates from the discovery, in 1859, of the now famous Comstock lode on the east flank of the Sierra Nevada, but its development has been marvellously rapid. The total production of silver in the United States rose from 150,000 dollars in 1860 to 16,000,000 in 1870, and then to the enormous sum of 48,800,000 in 1881; Nevada, Utah, and California being the main contributors. Very rich deposits of silver ore are said to have been recently discovered in Ontario (Canada), and as the Canadian Pacific Railway passes through the district, its resources will no doubt be speedily developed.

Silver as Money.—Silver has, like gold, been used in this capacity from a very early period, the superior qualifications of the two precious metals for this purpose having no doubt become manifest as soon as commerce on anything like a large scale was developed. A detailed account of silver money and coins will be found in the articles MONEY and COIN. In the present article we propose to describe very briefly the principal systems of metallic money which have been employed in modern times, more particularly in England, with especial reference to the part that silver has played in the currency; and then to summarize the active discussion, carried on for many years past, as to the best standard of value that can be adopted.

The simplest system of currency, and, therefore, the one naturally adopted by the first coiners of money, was that of a single legal tender, *i.e.* money of one kind of metal, in which all money contracts, in the absence of express provision to the contrary, must be paid. Professor Jevons in his interesting work on "Money" (London, 1876) tells us that—"In England silver was the only metal coined from the time of Egbert to that of Edward III., with the doubtful exception of a very few small pieces of gold. Silver was the sole legal tender and measure of value, and few coins except silver pennies were issued."

Currency in a single metal is open to the serious disadvantage that if a dear metal be chosen, small transactions are made difficult by the impracticability of supplying coins of sufficiently low value, while, if a cheaper metal be used, the mass of metal required for large transactions is very cumbrous and difficult to transport. In fact the convenience of a coinage consisting of gold, silver, and a third metal, bearing about the same relation to silver that silver does to gold, is so great that such coins are usually to be found in circulation whether issued by the government of the country or not. In Anglo-Saxon times gold *byzants* from Byzantium were used in England, and at a later period the gold coins of Florence, thence called *florins*. The want of pence was supplied by the issue of tradesmen's tokens, a practice which was not finally abandoned until comparatively recent years. Thus out of a single legal tender naturally grew up systems of a double or even multiple legal tender. "The Plantagenet kings of England, for instance," to quote again from Professor Jevons, "finding that though they coined only silver, the people made use of gold, eventually began to issue gold coins, and fixed the rates at which they should be exchanged for silver coins. In the absence of any special regulations to the contrary, this constituted a double-tender system, i.e. a system under which debts were legally payable in either metal. As, after a time, the ratio of values of the metals would fail to coincide with that involved in the relative weights of the coins, it became requisite to fix by royal proclamation a new value for one metal in terms of the other. From 1257 to 1664 the gold and silver currency of England was thus regulated, no coins of copper or any inferior metal being then issued. From 1664 to 1717 no proclamations were made upon the subject, and the value of the guinea was allowed to vary in terms of the shilling. At one time it rose nearly to 30s., owing partly to the decreased value of silver, but chiefly to the clipped and worn state of the silver money. During this interval, then, the country had a single silver standard."

In the early part of the eighteenth century a great deal of discussion took place upon the unsatisfactory state of the silver currency, and in 1717 Sir Isaac Newton, the master of the mint, recommended that the government should again fix the silver price of the guinea, and suggested 21s. as the best rate. His advice was adopted, and then there was again a double standard in England. But at the rate fixed gold was overvalued by rather more than $1\frac{1}{2}$ per cent. (i.e. to that extent it was more valuable as currency than as metal); and in accordance with the well-known rule, that the relatively cheaper medium of exchange will be retained in circulation and the relatively dearer disappear, the full-weight silver coin was withdrawn or exported, and gold became the practical measure of value. Our present composite legal tender system, however, was not formally established until 1816; when, on the recommendation of Lord Liverpool, gold was made the standard of value and principal legal tender: silver was reduced to the position of a token currency (i.e. one whose legal value is greater than its metallic value), and made legal tender only for amounts not exceeding 40s., this limit being apparently chosen because the gold two-pound piece was the largest coin in circulation.

A few years earlier, by "la loi du 7 Germinal, an XI." (27th March, 1804), the French government had adopted the double, or, as it is more commonly called, the bi-metallic standard, and fixed the ratio of silver to gold at $15\frac{1}{2}$ to 1 (i.e. $15\frac{1}{2}$ oz. of silver being taken as worth 1 oz. of gold). This rate, unlike ours of nearly a century earlier, happened to overvalue silver in some degree, and just as the over-valuation of gold had given us a gold currency, so the over-valuation of silver led to the French currency consisting mainly of the heavy five-franc pieces. It was not until the great discoveries of gold in California (1848)

and Australia (1851) had made gold in its turn the cheaper metal, that it began to replace silver. In 1865 (at the suggestion of Belgium, it is said) the much-talked-of Latin Monetary Union was formed between France, Belgium, Italy, and Switzerland (Greece joined later), by which those countries adopted the French bi-metallic system, and practically agreed to accept one another's coins as legal tender.

In 1873 the newly constituted German Empire adopted a single gold standard like ourselves, and introduced an entirely new currency. This involved not only a reduction of the usual demand for silver by the German states, but the withdrawal from circulation and sale of a very large quantity, variously estimated at from £20,000,000 to £50,000,000 worth, of the old silver currency. The Latin Monetary Union then, moved partly by political motives, and partly by the fear of having its gold again drained away and replaced by silver (the market price of the latter having once more fallen below the mint price), resolved to fix the amount of silver to be coined year by year, and thus abandoned the cardinal principle of bi-metallicism, the free coinage of both metals. The usual demand for silver for currency purposes was thus again curtailed. In 1876 the United States adopted what is known as the Bland Bill, fixing the amount of silver to be coined annually. About the same time, Norway, Sweden, and Denmark followed the example of Germany in substituting a standard gold currency for a silver one. Italy began to provide herself with a gold currency, and Holland, who some years before had demonetized gold, again became a competitor in the gold market. In 1879 the United States resumed specie payment, and absorbed a very large quantity of gold, estimated at more than £100,000,000. Thus by the action of all these states, the ordinary currency demand for silver was greatly reduced, and that for gold enormously increased; and thus at a time when the gold supply, which had decreased from £36,000,000 in 1852 to little more than £19,000,000 in 1871, was still gradually falling off while the supply of silver in the same period had been raised from about £10,000,000 to over £20,000,000 per annum. As Mr. Goschen pointed out in a paper read before the Institute of Bankers in April, 1883, over £200,000,000 of gold, or the whole amount produced, which, but for the action of the countries above-named, might have passed into the currency of the gold-using countries already existing, had in the last ten years been applied to a practically new purpose. Thus the fall of silver was intensified by the appreciation of gold, and the average price of silver, which from 1851 to 1873 inclusive had, according to Dr. Soetbeer, ranged between 60 $\frac{1}{2}$ d. and 62 $\frac{1}{2}$ d. per oz., fell in 1873 to 59 $\frac{1}{2}$ d., and has since gone on falling almost continuously, until in 1883 it stood as low as 48 $\frac{1}{2}$ d. for the year. For centuries there has been a steady drain of silver to the East, but about 1870 this received a severe check. The report of the parliamentary committee on the depreciation of silver in 1876, pointed out that since the Mutiny the home charges of the Indian government, which have to be met in gold, had increased from about £5,000,000 to about £15,000,000 per annum, the bulk of the increase having taken effect since 1870. The result is, as the report goes on to show, that the export of silver to India, which had averaged £10,000,000 a year, has been reduced to less than £5,000,000. The heavy and persistent fall of silver, combined with their own increase of Indian indebtedness, has been the cause of very serious embarrassment and perplexity to the Indian government, and they have repeatedly called the attention of the home government to the matter, and urged that some debt should be made to rehabilitate silver. The gold value of the rupee fell from 23 $\frac{1}{2}$ d. in 1871-72 to less than 18d. in 1886, inflicting upon the Indian government in its European payments a loss by exchange of over £3,000,000

in the latter year. The depreciation of silver has not as yet seriously raised prices in India, and the result has been, as the late Mr. W. Bagehot ably showed, to give a stimulus to the exports from India and reduce the imports to India, and thus tend to produce a balance of trade in India's favour which would have to be paid in silver, and so absorb some of the surplus. The fall of silver has therefore been of benefit to Indian trade, though so disastrous to the Indian government, which, mainly from the poverty of the mass of the people, is unable to impose fresh taxes, and the land revenue, which forms the bulk of its income, is usually fixed for long periods of years, and cannot be altered at will.

The appreciation of gold has no doubt had much to do with the steady fall in the prices of nearly all the staple articles of production which has eaten up profits, discouraged enterprise, and largely brought about industrial depression. Many proposals have been made by writers on currency questions to remedy this state of things, but the only one with any serious claim to consideration is the bold scheme of international bi-metallism advocated by an increasing number of eminent financiers and economists, among whom may be mentioned Mr. D. Barbour (financial secretary to the government of India), Messrs. H. H. Gibbs and R. H. Giffen (formerly governors of the Bank of England), General Walker (of the United States), M. E. de Laveleye (Belgium), Professor Sidwick of Oxford, and Professor Foxwell of University College, London. On the other side we find arrayed Mr. Giffen of the Board of Trade, Mr. J. N. Tutton, president of the Institute of Bankers, Mr. Goldwin Smith, Mr. Crump, the author of a work on the subject, &c. The late Professor Jevons and Mr. W. Bagehot, whose economic writings are so well known, were strongly opposed to the adoption of bi-metallism. Mr. Bagehot believed that the large quantities of silver thrown upon the market in Europe by demonetization, and in America by greatly increased production, would, by the action of what may be called the natural laws of trade, be evenly distributed over the whole commercial world, and that any serious disturbance of prices could only be more or less temporary.

The proposal of the bi-metallists is that the principal commercial nations should form a monetary union, much on the same lines as the Latin Union already described, fix a ratio between gold and silver; agree to take any amount of either metal offered for coinage at those rates (the only way of maintaining the price); and, what is of course equally indispensable, make both metals legal tender for any sum. The bi-metallists point to the fact that so long as France, and latterly the Latin Union, continued the free interchange of gold and silver, the ratio of 1 to 15½ was maintained with astonishingly slight variation for seventy years in spite of fluctuations of supply; and they say if one state or small group of states could effect this, how much more easily and certainly could a union of all the principal commercial nations do the same in spite of any probable variations of supply. They further argue that the heavy fall of silver is due rather to its partial demonetization and the uncertainty as to the future than to any real excess of supply, and they urge the advantage to commerce of the steady rate of international exchange, especially between East and West, which their plan is calculated to bring about. They also claim that this scheme would tend to secure that steadiness in the standard of value which is admitted on all sides to be so important. The opponents of bi-metallism are obliged to admit the desirability of the results claimed for it, but they contend that the English people would never consent to alter our existing single gold standard, which in many minds is regarded as having largely contributed to the commercial prosperity we have generally enjoyed since its introduction. They also dwell upon the inconvenience—Mr. Giffen even calls it “misery”—

which would result if our present gold currency should to a large extent be replaced by one 15½ times its weight and 28½ times its bulk. The bi-metallists are unable to deny that such would be the probable result of the system they advocate, though they urge that an issue of one pound notes, as in Scotland, but on a silver instead of a gold basis, would prevent any serious inconvenience. A more serious objection is that by raising and fixing the price of silver an enormous stimulus would be given to its production, which is at present liable to be checked at some point or other by a fall in its price. The general rise of prices which must follow the introduction of international bi-metallism would, it is also urged, be a great injustice to creditors, and amount to a breach of all existing contracts. It is true that debtors may be said to have already suffered heavily by the appreciation of gold; but that, it is contended, has been the result of what may be called natural causes—an argument which, although true as far as the changes of actual production are concerned, cannot be said to apply to the partial demonetization of silver by government action in several countries. The great mass of wage-earners would undoubtedly suffer for a time at least by the rise of prices, although that might be set off by the revival of trade and consequent increased demand for labour, which such a rise would tend to bring about. All persons with fixed incomes would, at any rate, be unfavourably affected. Another favourite objection is the extreme difficulty of forming and maintaining an international agreement of such a nature, and the bi-metallists admit that the success of their scheme largely depends upon its adoption by most of the great commercial nations. It is obviously impossible to give in the space at our disposal anything like a complete resumé of the arguments *pro* and *con*, but enough has been said to indicate the principal contentions on either side and the many serious considerations involved.

The alternative schemes proposed by the numerous class of writers, disrespectfully termed currency-mongers, do not profess to be more than palliatives. They mostly deal with the matter as it affects the Indian government, and cannot be dealt with even in the most cursory manner here.

The whole question of currency adjustment is, no doubt, a very complicated and difficult one, as is illustrated by the number of times that it has in one aspect or another been the subject of special investigation. In 1876 a parliamentary committee was appointed to consider the depreciation of silver. In 1878 an International Conference on currency matters was held at Paris, when the American delegates proposed a bi-metallic league, but were outvoted. Another International Conference again discussed the matter at Paris in 1881, but without any decisive result. The Royal Commission on the Depression of Trade having recommended a special inquiry into the group of questions which relate to the currency, a royal commission was appointed on 6th September, 1886, to consider the whole subject, and suggest remedies “within the power of the legislature or the government by itself or in concert with other powers.”

For full discussion of currency questions the reader is referred to Jevons's “Money” and “Investigations in Currency and Finance;” Walker's “Political Economy;” Barbour's “Theory of Bi-metallism;” Crump's “Review of the Position and Prophecies of the Bi-metallists;” Gibbs and Giffen's “Bi-metallic Controversy;” and Bagehot's “On the Depreciation of Silver.”

SILVER ORES. Silver occurs not unfrequently in the native state pure, or alloyed with copper, bismuth, or mercury, sometimes crystallizing in cubes and octahedra, and sometimes assuming a massive and branching form. But the metal is found most commonly in chemical combination with sulphur, and it is from the various ores of this composition that the supply for economic purposes is chiefly obtained. In Britain the ore is almost invariably

mingled in small quantities with the sulphide of lead (galena), and is separated by Pattinson's well-known process [see METALLURGY]; but in the foreign mines, the valuable mineral is usually much more isolated, and occurs in the form of several species. *Silver glance* or *argentite* (Ag_2S) is an almost pure sulphide of frequent occurrence in most mines; *ruby silver* or *pyrargyrite* (Ag_3SbS_4) is a brilliant dark-red species, sometimes translucent, especially abundant in Mexico, and containing antimony, in addition to an occasional trace of arsenic; and *stephanite* and *polybasite* are closely similar compounds, somewhat more rarely met with. The chloride of silver (AgCl) is also found in some mines, and from its soft horny or waxy consistency is commonly known as *horn silver*; it is largely obtained from the famous lodes of Potosi, in Bolivia, and likewise from certain workings in Mexico.

SILVERIUS, Pope from 536 to 538, was son of a former pope, Hormisdas, born before his father had entered the church. He was created pope by King Theodotos of the Ostrogoths, but when Belisarius, the great general of the Emperor Justinian, approached Rome, Silverius welcomed him warmly, and helped him to win it back to the empire from the barbarians. His reward was a bitter one. Antonina, the wife of Belisarius, was as completely the mistress of her husband in matters of state-intrigue as was the Empress Theodora of Justinian, and Antonina was charged to depose Silverius, and put a certain Vigilius, whom the empress favoured, in his place. Belisarius sought to save the Pope, who had been of such service to him, by inducing him to bow to various known demands of the Byzantine court. But Silverius refused. In consequence he was summoned to headquarters, where Antonina accused him (falsely) of treasonable correspondence with the Goths, stripped the pall from his shoulders, had him dressed as a simple monk and thus shown to the clergy who had accompanied him, with the careless words, "The Pope Silverius is now deposed and is a monk" (March, 537). The deposed pontiff was then exiled to Patara. But his determination upheld him, and he escaped to Byzantium, where he upbraided the orthodox Justinian with the shameless misgovernment carried on in his name. Justinian disavowed any knowledge of the whole proceeding, and ordered the instant return of Silverius to Rome, his trial, and his reinstatement if innocent of treason. But upon his appearance at Rome to fulfil the emperor's commands, Silverius was seized and given over to the Pope Vigilius, who banished him to the barren rocky island of Pandataria, where in a short time he died (538), probably by violence.

SILVESTER was the name of, or assumed by three of the popes.

SILVESTER I. (St. Silvester) succeeded Melchides in the see in 314. He saw, during his long reign, the completion of the conversion and baptism of the Emperor Constantine; and it was to him that the alleged DONATION was made (see that article). The right of holding landed property and receiving it by will, which was really granted to the church by Constantine, was of far greater real importance than this spurious donation; which latter, in fact, Ariosto openly relegates to the chimæras of the moon ("Orlando Furioso," xxxiv. 80). Silvester is famous as being the first to organize music as a help to church services. He founded a school of music at Rome, and though the times were too gross for it to flourish long after his death, the idea took root, and later popes profited by it. The Sistine Choir claims to have arisen from this school. Silvester died in 536. Ten years before, he had sent delegates to the famous Council of Nice (Nikaia), where the Nicene Creed was first promulgated (525).

SILVESTER II. (*Gerbert*) was a Frenchman, a native of Auvergne. He was at school in the branch of the Abbey of Cluny there, when the Count of Barcelona took a fancy to him, and took him to Spain. Here he penetrated into

all the scientific lore of the Mohammedans, then the only philosophers in Europe worth having. Hence the persistent evil reputation for necromancy and astrology which never ceased to accompany Gerbert alike through life and after death. His great learning made him famous, and he rose from preferment to preferment until the Emperor Otho II. made him Abbot of Bobbio, a foundation of the Irish Columban. He tried to regain the lands of the abbey, seized by neighbouring nobles, but the outcry was so great that he had to fly for his life. For ten years he taught science in the University of Rheims. Then, by the favour of Hugh Capet, who had usurped the throne of France, he was made Archbishop of Rheims (992); but he was deposed by order of Pope John XVI. (995), who was vehemently anti-Capetian. After a brilliant resistance, Gerbert was forced to yield, and took refuge with the young Emperor Otho II. He entered warmly into Otho's grand conceptions of restoring to Rome the seat of empire. Otho made him Archbishop of Ravenna (999), and on the death of Gregory V. in the same year created him pope. In his decree the emperor expressly assumes the power to create popes. Otho gave over to the new pope eight counties for his maintenance. In delicate compliment to the new "Constantine," Gerbert took the name of "Silvester." But the rapidly growing prosperity under Otho was suddenly checked by his murder by Stephana, who poisoned him in 1002, in revenge at an outrage committed on her years before by some German soldiers. The next year Pope Silvester died also by poison, probably from the same hand (1003). William of Malmesbury, the early English chronicler, is full of the "magic" of this pope, whom he even accuses of performing his wonderful deeds because of actual homage paid to the devil. Such were the prejudices against natural science in the eleventh century.

SILVESTER III. was the title assumed by John, Bishop of Sabina, when elected to the papal see in 1011, because of the abominable life of the Pope Benedict IX., who disgraced and plundered the church rather than ruled it. But Benedict returned from a brief exile, and strong in his kindred, drove Silvester from Rome a few months later, and sold the holy office to John the Presbyter, who assumed the style of Gregory VI. The Emperor Henry III. called a council at Sutri, 30 miles from Rome, to decide between the three claimants. He degraded all three. Benedict for shameless life, Silvester as a usurper, Gregory for flagrant simony; and Clement II. was created pope in their stead. Silvester was sent to a monastery to be imprisoned for life (1016).

SILYBUM is a genus of plants belonging to the order COMPOSITE, and tribe Cynaroideæ. *Silybum marianum* (the milk thistle or Our Lady's thistle) is found in warm places in Britain. It is a stout herb, 3 or 4 feet high, with a furrowed stem and very large wavy spreading leaves, of which those next the root are variegated with green and milk-white. The flower-heads are large and globose, and the florets are purple with long tubes. It was formerly cultivated for the table, the root being boiled as a potherb, the young leaves used for salad, and the heads used like the heads of the artichoke. The name refers to the legend that the stain on the radical leaves was caused by a drop of the Virgin's milk.

SIMARUBEÆ is an order of plants belonging to the group THALAMIFLOREÆ. The species are not numerous, and the great majority occur within the tropics. They are trees or shrubs with the leaves alternate, exstipulate, without dots, usually compound. The flowers are generally small, unisexual or hermaphrodite, regular, in axillary panicles or racemes; the sepals and petals are from three to five; the stamens usually twice as many, inserted round the base of the disc; the ovary four to five lobed, with as many styles and cells as lobes, and one ovule in each cell. The fruit is various. The whole order is remarkable for great bitterness. *Simaruba baki* is the bark of the root of the

Simaruba amara, a tall tree, native of Guiana, and also of the West Indies, where it is known as the Mountain Damson. It was first introduced into England in 1713. Its chief constituents are quassin, resin, a volatile oil having an odour like benzoin, ulmin, mucilage, and some salts. It is tonic and demulcent in small doses, and therefore useful in dyspepsia, diarrhoea, and dysentery, but in larger doses it is emetic. *Simaruba versicolor*, a Brazilian species, is so bitter that no insects will attack it, and hence the powdered bark is used to destroy vermin. The fruits and the bark are used as anthelmintics. The QUASSIA of commerce is largely yielded by the wood of *Picranea excelsa*, the bitterwood of Jamaica, and also by *Quassia amara*, from tropical America and the West Indies. The species of BRICIA from tropical Africa and Asia possess similar tonic properties. The Cedron of commerce is the seed of *Simula cedron*, a native of New Grenada, where it is greatly esteemed as a remedy for the bites of serpents, scorpions, &c., and is also largely used in intermittent fevers.

SIMBIRSK, a town of Russia, the capital of the government of the same name, is situated partly in a fertile plain on the right bank of the Volga, and partly on a hill, behind which flows the Svarga in a contrary direction; so that the city is on the right bank of each of these rivers, though they unite only at a distance of 105 miles north of it. The town is not regularly built, yet there are some broad and straight streets. There are two monasteries, a gymnasium, manufactures of candles and soap, and some tanneries. The town has a great transit trade on the Volga, and a noted annual fair. The principal exports are corn and fish. Simbirsk suffered severely from fire in 1861 and 1865, and since then many houses have been built of stone. The population is about 20,000.

SIMFER OPOL (*Akmetchek*, or white mosque), the seat of the Russian government of Taurida, in the Crimea, is situated on an elevated plateau above the river Salgir, 49 miles north-east of Sebastopol by rail. The old Akmetchek or white mosque now forms the Tatar quarter, having lofty walls, crooked streets, and numerous minarets, domes, and bazaars; but Simferopol properly so called is a modern town, and very handsome. The Russians, on taking possession of the country, left the old capital of Baktchessrai to the Tatars, and built at Simferopol a city according to their own taste, with immensely long and broad streets, in which horse-races might be held without interrupting the usual traffic. Being near the centre of the peninsula, it is well calculated for the seat of government. There are many pretty houses, with iron roofs painted green and adorned with columns. Besides the government offices, there are a cathedral, Russian, German, Greek, and Armenian churches, four Tatar chapels, a gymnasium, and a seminary for schoolmasters. There are some handsome villas and gardens in the neighbourhood, and fruits are grown in large quantities. The population is about 30,000. The town has no manufactures of importance.

SIMI'ADÆ. See APR.

SIMILAR FIGURES, in geometry. Similarity, resemblance or likeness means sameness in some, if not in all, particulars. In geometry the word refers to a sameness of one particular kind. The two most important notions which the view of a figure will give are those of size and shape, ideas which have no connection whatsoever with each other. Figures of different sizes may have the same shape, and figures of different shapes may have the same size. In the latter case they are called by Euclid *equal*, in the former *similar*.

Similarity of form is a conception which is better defined by things than by words, being in fact one of our fundamental ideas of figure. A drawing, a map, a model, severally appeal to a known idea of similarity, derived from, it

may be, or at least nourished by, the constant occurrence in nature and art of objects which have a general though not a perfectly mathematical similarity. The rudest nations understand a picture or a map almost instantly. Granting then a perfect notion of similarity, we now ask in what way it is to be ascertained whether two figures are similar or not. To simplify the question, let them be plane figures, say two maps of England of different sizes, but made on the same projection. It is obvious, in the first place, that the lines of one figure must not only be related to one another in length in the same manner as in the other, but also in position. Consider only the dots which represent the towns. Join every such pair of dots by straight lines; then it is plain that similarity of form requires that any two lines in the first should not only be in the same proportion, as to length, with the two corresponding lines in the second, but that the first pair should incline at the same angle to each other as the second. Similar segments of circles are those in which similar triangles can be described, that is, those which are the same fractional part of the whole circle from which they are taken. All similar plane figures are to one another as the squares of any two of their similar sides; in the case of curvilinear figures the ratio is that of the squares of the respective diameters. Similar solids are those contained by two series of similar planes similarly situated; and their ratio to each other is the ratio of the cubes of any pair of their similar sides.

SIMILAR MOTION, in music, is when two parts move together, both ascending or both descending. In the second bar of the illustration to the article CONTRARY MOTION, the two treble parts are moving in similar motion with each other, and so are the two bass parts, though the treble as a whole is in the contrary motion with the bass.

SIMILARITY, PERCEPTION OF, is one of the three great factors of INTELLECT; the others being the consciousness of DIFFERENCE and retentiveness or MEMORY. Professor Bain's statement of the law of similarity, which can scarcely be improved upon, is that "Present Actions, Sensations, Thoughts, or Emotions, tend to revive their like among previously occurring states." The power of ASSOCIATION OF IDEAS has been shown in another article; it is what might be called the natural adhesiveness of ideas, whereby things which happen together several times come to be thought of in common, as when we always think of light with heat, sound with fracture, &c. But beyond this power of associating things occurring simultaneously, the intellect has the power to associate like things separated in time or place, and it is this latter power which is the subject of the present article. For instance, a photograph calls up the image of an absent friend.

But the perception of similarity goes beyond this; and its most valuable side is that which enables the mind to detect likeness in unlikeness, to perceive the points of similarity in a thing more or less dissimilar. Thus our photograph may suggest not only the friend whose exactly similar image it is, but also his mother or his brother, who are like him in some things and unlike in others. It is this power which gives the never-failing enjoyment to the pun, or play upon words, and to the parody or caricature, where the humour lies in detecting the close points of similarity between the words played upon, the poem and its mimicry, or the statesman and the laughable perversion of his countenance, while yet the original and the counterfeit are so utterly diverse in their total effect. A far nobler function is that of the formation of abstract ideas, so that by perception of a common attribute among a number of beautiful objects we arrive at the idea of beauty, or by perception of a virtue shared by all noble-minded men, we arrive at the idea of benevolence; things which have no separate existence in fact, and yet which we find it so irresistible to consider as absolute entities that large numbers of thinkers in all ages of the world have

imagined them to be *real* and not merely *nominal*. All classification rests upon this perception of similarity, and he is the best classifier who has the power in the greatest degree, for from the large number of similar points he perceives he can select those which form the best basis for the construction of a class. The naturalists class the whale with the cow (under mammals) because of the vast importance of the points of similarity which their large knowledge and keen perception discover; but to the ignorant person who is only able to see the external likenesses of form and habitat, a whale is a fish. It is to unusual powers of perception enabling them to detect hitherto unrecognized links, that all great theorizers, whether in the natural or the mental world, owe their wonderful discoveries. It was only a Newton who could perceive the likeness between the perpetual fall of the moon towards the earth and the swiftly passing fall of an apple to the ground.

SIM'ILE (Lat., a like thing) is defined by Johnson to be "a comparison by which anything is illustrated or aggrandized." A metaphor differs from a simile in expres-

sion, inasmuch as a metaphor is a comparison without the words which indicate the resemblance, and a simile is a comparison where the objects compared are kept as distinct in expression as in thought. Similes are usually misplaced in passionate poetry, but metaphors constitute the very language of passion; for the mind, when moved, catches at every slight association to express itself, but never dwells on them with the deliberateness of a comparison.

SIM'ILI, a very useful mark in musical shorthand, consisting of a diagonal bar with two dots (//) roughly representing the letter S, which it has come in the course of time to replace. This mark is drawn across the staff instead of writing out a repetition of a certain figure of accompaniment, &c., or the word *sim.* is written above the bar. The use of simili marks is not very great in modern printed music, but is still very usual in MS., and is frequent in old music.

SIM'LA, a British sanatorium in India, 7866 feet above the sea, and about 170 miles north of Delhi. It was chosen by successive governors-general for an occasional visit; but the fact of Sir John Lawrence making it his



Simla.

residence every hot season gave it importance, and it may now be called the summer capital of British India.

Looked at only in the light of its climate, scenery, and society, Simla is glorious. Weather such as it enjoys from September to November and March to June, is not to be equalled in the finest months in England, Switzerland, or Italy. The very cold and the very rainy months are quite as tolerable as the ordinary English climate with its fickle changes. All the English fruits are to be found in perfection in the station on the surrounding hills, except the pear and apple, which are good only for cooking. The earth is carpeted with flowers gayer than those of well-tended gardens, for nowhere else can whole forests of roses

and rhododendrons be seen. Simla is more beautifully wooded than any other hill station. Its splendid firs send forth their piny smell, and its deodars or cedars of Lebanon rise to a height and display a gracefulness unknown elsewhere. Waterfalls and occasional patches of water, on mountain torrents rushing down to join the mighty Sutley, relieve the eye in the cool ravines, so deep and vast that the rays of the sun never reach them. Indeed, so overpowering is the magnitude of the ranges and the distance between their heights that the mind fails to appreciate their beauty, unless in some smaller gorge, which is only one of a thousand among their spurs.

The public institutions of Simla include the Bishop

Cotton's School, the Punjab Girls' School, the Mayo Industrial Girls' School, a Roman Catholic convent, and a dispensary. The government buildings comprise a district court-house and treasury, *tahsil* and police office, post-office, telegraph station, and staging bungalow. The commerce of the town consists mainly in the supply of necessities to the summer visitors and their dependants; but a brisk export trade exists in opium, *charras* (an intoxicating preparation of hemp), fruits, nuts, and shawl-wool collected from the neighbouring hills. Numerous European shops supply the minor wants of visitors, most of them being branches of Calcutta firms. The station has two English banks, a club, and several churches; and two European breweries are situated in the valley below. The great deficiency of Simla lies in its inadequate water supply. The springs are few in number, and several of them run dry during the summer months, when the demand is greatest.

SIMON, COUNT DE ST. See SOCIALISM.

SIMON MACCABÆUS. See MACCABEUS.

SIMON MAGUS, a celebrated magician who flourished in the first century of the Christian era. He was born at Gutton, a village of Samaria, but was educated at Alexandria, and subsequently became a pupil of Dositheus, who preceded him as a teacher of Gnosticism in Samaria. Simon subsequently supplanted his master, and acquired such influence among the Samaritans as to be called "that power of God which is called Great." He appears to have been strongly impressed by the circumstances attending the mission of Philip the evangelist, of whom he became a disciple, submitting to the rite of baptism, and later, after seeing the results which followed the laying on of hands by Peter and John, he endeavoured to purchase from them what he supposed was a secret of an art similar to his own. This offer drew upon him the terrible denunciation of Peter, recorded in Acts viii. 20-23, and it has attached his name for ever to the practice of buying or selling any ecclesiastical dignity or preferment. His subsequent history is very obscure, but he seems to have travelled through several countries going exhibitions of his powers, and finally to have settled at Rome, where he lost his life in an aeronautic experiment. By some of the early historians of the Christian church he is depicted as the pertinacious but always defeated foe of Peter, in answer to whose prayer he met with the disaster which led to his death; but these stories are obviously legendary. What is more certain is, that he founded a sect called the Simonians, which lasted until the fourth century, though the members had before this split into several parties. He was also the author of several books, of which a few fragments only remain. They have been collected by Grabe, and published in the first volume of his "Spicilegium."

SIMONIDES, a famous Greek lyric and dithyrambic poet, was a native of Iulis, in the island of Keos, and was born about B.C. 556. He appears to have removed to Athens about B.C. 525, where he was well received by Hipparchus, and became acquainted with Anacreon and Lasos. After the banishment of Themistokles and the death of Perikles, with both of whom he lived on intimate terms, he returned to Hieron's court at Syracuse, where he died, B.C. 467. The first prize he gained at Athens was for a dithyrambic ode, in B.C. 477; and this made the fifty-sixth prize he had won.

Most of his poems are lost; but we can judge of his merits by the little that remains. He was one of the most distinguished of the elegiac poets, and particularly excelled in the pathetic, as we see in his "Lament of Danaë" and other fragments. He conquered Aischulos (Æschylus) in a competition for the best elegy on those who fell at Marathon. Some of his best pieces are his epigrams or short inscriptions, of which one of the most celebrated commemorates the Spartans who fell at Thermopylæ. It is

simply as follows:—"Stranger, tell the Lacedæmonians that we lie here in obedience to their commands." The remains of Simônides have been published by Schneidewin (1835, 8vo), and by Bergk, in his "Poetæ Lyrici Græci" (1843). The fragmentary character of the remains of Simônides is greatly to be deplored. He was always held as the perfecter of the elegy and epigram, and was the only poet who could rival Pindar at the ode. His sweetness of versification and elaborate finish made him the most popular poet of his time.

SIMON'S TOWN, a town of South Africa, in Cape Colony, situated about 25 miles south-east of Capetown, at the base of a lofty mountain. It possesses a naval yard and dockyard establishment, military barracks, several forts and defensive buildings, and has a population of about 3000. It is the only naval depôt Great Britain possesses south of the equator in the Indo-Pacific Ocean, and is sheltered from the effects of all the violent winds.

SIMONY is the buying or selling for money or other corrupt consideration any ecclesiastical benefice, dignity, or preferment, or the causing a clerk to obtain or to relinquish such benefice or preferment for corrupt consideration. The word is derived from Simon, who offered money to Peter and John in order that he might obtain from them apostolical powers (Acts viii. 18-24).

Whether simony was an offence at common law is at least doubtful. But it is an ecclesiastical offence by the canons both of the Roman Catholic and of the Anglican church. The fortieth canon of the latter (1603), "to avoid the detestable crime of simony, and because the buying and selling of spiritual and ecclesiastical functions, &c., is execrable before God," prescribes an oath to be administered to every person assuming such offices, by which he denies that he has made any simoniacal payment, contract, or promise, directly or indirectly, for procuring such ecclesiastical office, or that he will perform any such contract made on his behalf without his knowledge.

The law upon the subject is regulated by 31 Eliz. c. 6, by which a simoniacal presentation is declared void, and two years' value of the benefice forfeited, one-half of the forfeit to go to the crown, the other half to the person suing, and the person accepting the benefice is for ever debarred from holding it. See ADVOWSON and BENEFICE.

SIMON'. See SIMONCO.

SIMPLE EQUATIONS are those statements of equality which do not contain any quantities in more than the first degree. Thus $x = 2y + 1$ is a simple equation; but $x = 2y^2 + 1$ is not. Another term for them is "equations of the first degree," and yet another is "equations of one dimension."

Simple equations involving one unknown quantity, such as $x - 2 = 7$, are soluble by themselves; but if there are two unknown quantities, there must be two equations, and if three unknown quantities, three equations, and so forth. Thus from $x = 2y + 1$ we can gain no solution of the actual values of x and y ; but if we also have $8x = 7y$, we can put the old value of x into the new equation, having multiplied it by 8, and thereby getting $3(2y + 1) = 7y$, we see at once that $y = 3$, and consequently that $x = 7$.

In this little operation we practically assume, what is the fact, that the equal multiplication of both sides of an equation does not destroy its equality. It follows, of course, that we may divide both sides of an equation by the same divisor and still preserve the equality. We may further add to each side or subtract from each side exactly equal amounts. All these operations enable us to clear equations of fractions, or to simplify them in other ways, and so render their solution easier.

It results from the above powers that we may transpose any quantity from one side of the equation to the other by altering its sign. For let our equation be as before:—

$$x = 2y + 1.$$

Then let us add -1 to both sides, which we know will not alter the equality, and we have

$$x-1=2y+1-1=2y,$$

where we see that the figure 1 has been transferred to the other side of the equation and its sign altered. The further point follows that if every term in both sides of an equation be altered in sign the equation holds good; and this power often stands us in good stead. Thus if

$$x-a=y-b,$$

then also

$$a-x=b-y,$$

which may possibly be a much easier question to solve.

SIMPLE TIME, in music. See **TIME**.

SIMPLE TONES, in acoustics, are those musical sounds which are isolated, and have no upper partials. There are probably no really simple tones in nature, but there are many tones which although not really simple may be dealt with as such, because of the great distance or the inharmoniousness of their first upper partial. Such are the tones of **TUNING-FORKS**, which can be regarded for all practical purposes as simple tones when their prime tone is reinforced by their being held over a resonance chamber (a bottle of suitable size will do), so that it quite overpowers the faint and inharmonious second partial. Of course partial tones are simple, such as the **RESONATOR** sifts out from ordinary musical tones, which are all compounds. But on the other hand *harmonics*, such as the violinist or flautist produces, or such as may be heard dying away in ascending order as the tone fades from an undamped pianoforte string, are *not* simple tones, but compound tones. The primes of these successive harmonics follow the same order with the succession of partials, consequently musicians not familiar with the analysis of the resonator confound them with the partials and regard them as simple tones. Stopped organ-pipes of very wide scale, whose first partial is almost annulled by its want of coincidence with the proper tone of the mass of air contained by the pipe, also give tones which are for all practical purposes simple tones. The tones of the **SIREN** are not simple tones, but compound, though with few partials.

Simple tones are very dull and characterless, and are not all easy to recognize definitely as to pitch unless in the middle octaves. They sound as if in a lower octave when compared with ordinary musical tones of the same pitch, but with plenty of partials, bright, keen, highly colored, and sharply defined. A reed-stop on an organ is almost unbearable if even slightly out of tune, while the stopped diapasons, with their dull simple tones, always sound sweet and agreeable, although when tested they may be very wide of the mark. The sweetness of simple, or nearly simple tones, is too luscious for enjoyment, except for occasional contrast. Our ordinary musical food must consist of tones of easily recognizable quality, and varying quality of tone is only to be obtained by the varying force and number of partial tones. Simple tones are almost alike. We can scarcely distinguish between simple tones of widely differing origins.

SIMPLICIUS, Pope (468-83), was the successor of Hilarius. It was during his occupancy of the see of Rome that the sceptre fell from the nerveless hand of Romulus Augustulus, and that the barbarian Odoacer became ruler of Italy. It is very curious that though many documents remain to us of the date of this reign they are concerned with church affairs in the East, and there is not a mention of the great catastrophe which put an end to the Roman Empire after so many centuries of existence. Akakios, patriarch of Constantinople, was aiming at the headship of the church, was consecrating bishops and the like, and Simplicius took high ground against this assumption of papal authority (479). While the controversy was still at its height Simplicius died.

SIMPSON, SIR JAMES YOUNG, the discoverer of chloroform, was born at Bathgate, in Linlithgowshire, 7th June, 1811. His father was a baker, and James, the youngest of three sons, being designed for the same trade, was apprenticed to a baker in Stockbridge. As he evinced, however, a passionate love for study, his elder brother generously spared sufficient from his own scanty means to send him to the High School of Edinburgh, and thence to the university. He won the Macpherson bursary in open competition, in 1830 obtained the license of the Edinburgh College of Surgeons, and graduated doctor of medicine in 1832. Having been appointed assistant to Dr. Thomson, the professor of pathology, he commenced an extra-academical course of lectures on midwifery, and was elected to the chair of midwifery in 1839. He now devoted himself with untiring assiduity to the study of diseases peculiar to women. His reputation rapidly extended beyond the limits, not only of Edinburgh, but of Great Britain.

In 1816, Dr. Morton, of Boston, administered sulphuric ether vapour, and removed a tooth from the patient during the unconsciousness produced by it. At this time it was believed that the period of insensibility could not be prolonged with safety; but Simpson, whose compassion had been excited by the sufferings of women in childbirth, administered ether on 19th January, 1847, with complete success, in a case of unusual difficulty and severity. From this time he employed it, with few and rare exceptions, for every patient he attended, notwithstanding the opposition of many obstetricians of repute, and he also commenced a series of experiments with the view of finding a safer and more thorough anæsthetic, which resulted in the discovery of **CHLOROFORM**.

The objects to which Dr. Simpson subsequently gave his principal attention were important, but not to be compared with the great discovery with which his name stands identified. "Acupressure," or a means of securing blood-vessels by needles, has not been generally accepted at the value placed upon it by its inventor, while his theories respecting hospital mortality and the "stamping out" of small-pox by isolation, caused his fame to shine with a somewhat diminished lustre. The honours and rewards, however, earned by his earlier achievements flowed in upon him in an unbroken and continuous stream. He was made a baronet in 1852. In addition to his labours as a physician, he managed to devote much time and ability to the study of archaeology. His principal medical works were republished collectively in 1871, and his archaeological essays in 1872. He died on 6th May, 1870.

SIMULIUM is a genus of insects belonging to the order **DIPTERA** and family **Bibionidae**. The species of this genus are the Sandflies of northern latitudes, where they are justly dreaded for their blood-sucking habits. The Columbat-ch Fly (*Simulium columbatshense*) occurs in swarms in Hungary and along the lower Danube, where it is a formidable plague both to cattle and men. Even in this country there is a species (*Simulium reptans*) which inflicts severe bites. In South America the genus also occurs among the swarm of blood-sucking insects known as mosquitoes. These insects resemble the common fly in appearance; the legs are rather short and stout, the wings large, and the antennæ very short. The larvae are aquatic, and spin a cocoon which incloses the hinder end of the body of the pupa; the perfect insect emerges under water.

SINAI, a peninsula and a mountain mass of Arabia Petra, separated from Egypt on the west by the Bay of Suez, and from Arabia on the east by the Bay of Akabah. The mountain mass has a breadth of 60 miles and a length of 70, and consists of granite, syenite, and porphyry, broken up by numerous *wadis* or valleys, which are sometimes clothed with tamarisk, mimosa, and grasses. The most important sites are as follows:—Convent of St.

Catherine, 5452 feet above the sea; Jebel Serhal (Mountain of Myrrh), Sinai of old tradition, also of Kitto and Lepsius, 6759 feet; Jebel Mousa (Mountain of Moses), Sinai of modern tradition, 7564 feet; Jebel Katerin (Mountain of St. Catherine), Horeb of Ruppel, 8705 feet; Um-Shomer (the Mother of Fennel), 8850 feet. None of these particular points answer to the Scriptural account of the giving of the law "on the top of the mount," "in the eyes of the children of Israel," "in the sight of all the people." There is not space enough in the narrow precipitous ravines immediately adjoining for the vast host to have encamped with the order and comfort so clearly intimated. But a site every way suited for the assemblage is found in the plain of El-Raha, a noble expanse, and the only large convenient area in the entire district. This is overlooked by a northerly prolongation of Jebel Mousa, the cliff of the Ras Sasafeh, or the "Willow Head," which rises with great magnificence, and has the yellow plain sweeping down directly to its base. Still the identification of the exact spot is entirely based upon conjecture. [See also ARABIA.] In 1869 a party of English engineers were employed to survey the whole peninsula, of which there did not previously exist even a trustworthy map. The ancient inscriptions carved on the rocks were copied, photographs taken of prominent places, and collections made of the botany, geology, and natural history of (to use the scriptural term) the Wilderness. The result of all this labor was published in 1872, and forms five very fine volumes of immense interest and value. Together with the late Professor Pulney's able work, "The Desert of Exodus," these volumes form the most complete and exhaustive modern account of the country.

SINAMINE, a basic substance obtained by the action of oxide of lead on the sinimine ($C_9H_7N_2S$), from which it differs by one atom of sulphydric acid (H_2S). It crystallizes in white prisms, having the formula $2C_9H_7N_2S.H_2O$. It is very bitter, and soluble in water, alcohol, and ether. The solutions are strongly alkaline, and are precipitated by tannin. It is a strong base, expelling ammonia from its salts. It forms salts with acids, but these are not obtained in a crystallizable form. The formula of the double platinum salt is $C_9H_7N_2S.2HCl.Pt_2Cl_6$.

SINAPINE, an organic base found in white mustard seed, in which it exists as sulphocyanate. The formula is C_9H_7NO . It is only known in solution, which has an alkaline reaction. The salts of sinapine are colourless and crystalline, and soluble in water. The sulphate ($C_9H_7NO.H_2SO_4$) crystallizes in rectangular plates, soluble in water and alcohol, but insoluble in ether. The sulphocyanate ($C_9H_7NO.CNHS$) can be obtained direct from mustard seed by extracting it with alcohol. It crystallizes in pearly needles, and is very bitter and hot to the taste; it is soluble in water, alcohol, and ether. When boiled with potash it is decomposed into sinapate of potassium ($C_9H_7K_2O$), sulphocyanate of potassium ($CNKS$), and sinicaline (C_9H_7NO). The first salt is the potassium salt of sinic acid, which crystallizes in colourless prisms, having the formula $C_9H_7K_2O$; it is soluble in hot water and alcohol, but insoluble in ether. It is coloured red by chlorine water. It forms crystalline salts, which decompose and turn red on exposure to the air. Sinicaline forms a crystalline mass, is alkaline, and combines with acids, forming deliquescent crystalline-soluble salts. The chloroplatinate has the formula, $2C_9H_7NO.2HCl.Pt_2Cl_6$.

SINAPIS. See **MUSTARD**.

SIND, a province of British India, included within the Presidency of Bombay, lying between 23° and $28^\circ 40'$ N. lat., and between $66^\circ 50'$ and 71° E. lon. The area is 56,652 square miles, and the population 2,500,000, including in both cases the Khairpur native state. The province of Sind consists of the lower valley and delta of the Indus. Almost every portion of the great alluvial

tract of Sind has at some time or other formed a channel for the river Indus itself, or one of its many branches. The main central stream of North-western India, after collecting into its bed the waters of the five Punjab rivers, has deposited near its debouchure into the Indian Ocean a vast mass of deltaic matter, through which it flows by several shifting channels to join the sea on the southern border of the province. In every direction traces of ancient river beds may be discovered crossing the country like elevated dykes; for the level of the land, as in all other deltaic regions, is highest at the river bank. The Indus brings down from the turbid hill torrents a greater quantity of detritus than can be carried forward by its diminished velocity in the plain, and hence a constant accumulation of silt takes place along its various beds, raising their level above that of the surrounding country, and incidentally affording an easy opportunity of irrigation by side channels drawn from the central river. The only elevations deserving the name of mountains occur in the Kirthar range, which separates Sind from Baluchistan, and attains in places a height of more than 7000 feet above sea-level. The plain country comprises a mixed tract of dry desert and alluvial plain. The finest and most productive region lies in the neighbourhood of Shikapur and Larkhana, where a long narrow island extends for 100 miles from north to south, inclosed on one side by the river Indus and on the other by the Western Nara. Another great alluvial tract, with an average width of 70 or 80 miles, stretches eastward from the Indus to the Eastern Nara. The Indus appears at one time to have spread its fertilizing waters through the wide waste at present known as the Eastern Desert, in the district of Thar and Parkar. Vestiges of ancient towns still stud the treeless expanse, and dry water-courses intersect it in every part. Sandhills abound near the eastern border, shifting under the influence of each prevailing wind. Large tracts rendered sterile for want of irrigation also occur in many other parts of Sind.

The scenery of Sind naturally lacks variety or grandeur, and its monotony renders it tame and uninteresting. Nothing can be more dreary than the low and flat coast, entirely devoid of trees and shrubs. Even among the hills of Kohistan, where fine rocky scenery abounds, the charm of foliage is almost totally wanting, owing to the volcanic nature of the rock. Lakes are rare, the largest being the Manchhar in the Sehwan subdivision, formed by an expansion of the Western Nara. During the inundation season it measures 20 miles in length, and covers an area of about 180 square miles.

The soil of Sind consists of a plastic clay, strongly impregnated with salt. When covered by the floods (*lets*) of the Indus, either through artificial irrigation or through spontaneous change of channel, it quickly assumes the appearance of a rich lowland; and it changes its aspect as quickly to that of an arid desert when the water is once more diverted elsewhere. The land is thus fertile enough in the immediate neighbourhood of the existing river branches to yield two or more crops in the year without manuring. Nevertheless, the soil contains a large admixture of saltpetre; and in Southern Sind, where sand greatly prevails, it is so impregnated with common salt as to produce it in abundance by evaporation after simply pouring water through its surface. The delta of the Indus contains no forests, but its shores and inlets abound with low thickets of mangrove trees, whose timber makes a good fuel. The forest department has lately introduced several valuable exotics, including the tamarind, the water-chestnut, and the tallow-tree. The revenue from this source has largely increased, and considerable quantities of firewood are now exported to Bombay by way of Keti-bandar. One-third of the indigenous vegetation is Arabian or Egyptian. The native fauna includes the tiger, found occasion-

ally in the jungles of Upper Sind, the hyæna, the *gurlhar* or wild ass, the wolf, fox, wild boar, antelope, and hog-deer, as well as the vulture and several falcons. The flamingo, pelican, stork, crane, and Egyptian ibis frequent the shores of the delta. Bustard, rock-grouse, quail, and partridge occur among the game-birds; while flocks of wild geese, *kulang* ducks, teal, and curlew cover the lakes and *dundhs* during the cold season. Venomous snakes abound, and yearly cause a large number of deaths. The river fisheries of the Indus and its offshoots not only supply the province with fresh fish, but afford a considerable export trade in dried *pala*. Among domestic animals the camel, of the one-humped variety, ranks first as a beast of burden, immense numbers being bred in the salt marshes of the Indus. Great herds of buffaloes graze on the swampy tracts of the delta, and *ghi*, made from their milk, forms an important item of export trade. Sheep and goats abound in Upper Sind, on the borders of the Pat in Shikampur District, and in Thar and Parkar. The horses, though small, are active, hardy, and capable of enduring great fatigue. The Baluchis of Upper Sind pay much attention to the breeding of mares. The bullocks are small in size, and chiefly used for draught or for turning irrigation wheels.

Agriculture.—The total extent of cultivated land in Sind is less than 2,000,000 acres, by far the greater portion of the province being absolutely barren. There are two principal harvests—the *rabi*, sown in August, September, or October, and reaped in February, March, or April; and the *kharif*, sown during the floods of the Indus, in May, June, July, or August, and reaped in October, November, or December. The *rabi* consists of wheat, barley, gram, vetches, oil-seeds, indigo, hemp, and vegetables. The *kharif* includes the millets known as *bajra* and *joar* (the two chief food grains in Sind), rice, oil-seeds, pulses, and cotton. The fruits common to the country include dates, plantains, mangoes, limes, oranges, pomegranates, citrons, figs, grapes, tamarinds, mulberries, and melons. The apples of Sind are famous for their fine quality. The British authorities have introduced apricots, peaches, and nectarines with excellent results. The methods of cultivation still differ little, if at all, from the primitive types. Rotation of crops is unknown, and the implements belong to the coarsest patterns. Two bullocks generally draw the clumsy native plough; while a heavy log of wood, with a man perched on either end, and drawn by four bullocks, does duty for a harrow. The dry character of the soil, and the almost complete absence of rain, render irrigation a matter of prime importance to the cultivator. Though situated on the very verge of either monsoon, the province derives no benefit from their rainfall; for the north-western monsoon, which deluges the hills of Baluchistan, extends no further eastward than Karachi; while the south-western monsoon terminates at Lakhpat Bandar on the boundary of Cutch (Kachehh) as regularly as though it intentionally avoided the frontiers of Sind. Sometimes, indeed for two or three years in succession, no rain falls in the province. Under these circumstances the Indus almost becomes to Sind what the Nile is to Egypt. Numerous irrigation canals, drawn from the main river or its tributaries, intersect the country in every direction. These canals are carried away from the raised bed of the stream in an oblique direction, so as to secure the greatest possible fall per mile. None of them have their heads where the bank is permanent, and none are deep enough to draw off water except during inundation. The river must consequently rise several feet before the canals will fill. Many of the channels are old natural beds of the side branches, now deserted, and all have the appearance rather of rivers than of artificial cuts. The canal system is very imperfect, owing to the want of permanent headworks and the constant accumulation of silt.

Cultivation is accordingly exposed to many risks, except in those lands where irrigation is always carried on by means of water-wheels; but as this method is expensive, the poorer cultivators prefer the inferior and precarious tillage of lands which can be directly flooded from the canals, where a small deficiency of water often entirely cuts off the whole crop. From the capricious nature of the water supply, cultivation accordingly becomes a species of lottery, the cultivator being rich one season and a bankrupt the next. Too little or too much water, an early or a late supply, may destroy his only chance of a harvest. Owing to the frequent failures agriculture is, on the whole, a poorly paid occupation; yet the peasantry prefer the gambling risk to steady and well-paid labour. This precariousness in the returns of cultivation renders the Sind peasantry an improvident and thriftless body. They are almost always in debt to the Hindu money-lenders, who often exact as much as cent. per cent. on their advances. The population is almost wholly engaged in agriculture, yet the province does not usually produce much more than a sufficient quantity of food grains for its own consumption, and considerable imports take place in years of scarcity. The trade centres almost entirely upon the great seaport of Karachi, a creation of British rule, and now the chief port of entry and exit for the Punjab.

The extreme south-eastern border of Sind is formed by the Rann of Cutch (Kachehh), an immense salt-water waste, with an area of about 7000 square miles. See Cutch.

Sind forms a province under a commissioner subordinate to the government of Bombay. Owing to its prevalent aridity and the absence of the monsoons, Sind ranks among the hottest and most variable climates in India. The average temperature of the summer months is 95° Fahr., and that of the winter months 60°. But the thermometer frequently rises in summer to 110°, and occasionally to 120°, while in winter it falls at night a few degrees below freezing-point, and ranges even in the daytime from 40° to 80°. No other part of India has so long a continuance of excessively hot weather, owing to the deficiency of rain. The climate on the sea-coast, however, is much more equable in temperature than that of Upper Sind; and Karachi, the great centre of European population, enjoys a strong sea-breeze, which blows day and night from April to October. In Northern Sind the extremes of temperature are strongly marked. The thermometer at Shikampur often sinks below freezing-point in winter, and ice forms as late as February, yet in summer, for weeks together, the readings at midnight do not fall below 100°. This great and prolonged heat, coupled with the exhalations arising from the stagnant pools left after the annual inundation, produces a fatal fever and ague. The natives suffer severely from its effects, and British troops have often experienced a terrible mortality. The other prevailing diseases include small-pox and cholera. The latter complaint has often appeared in an epidemic form, and wrought great mischief in the country districts; but at Karachi its ravages have been averted by the excellent sanitary precautions taken by the British authorities.

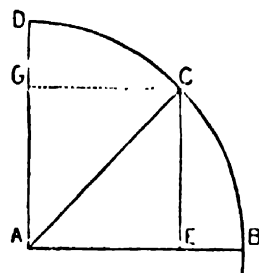
Sind owes its name, as well as its existence, to the River Indus or Sindhu, a Sanskrit term signifying water. The first connection of the British with Sind took place as early as 1758, in the matter of the abandoned factory at Latt. In 1799 a commercial mission was sent to Sind, to conduct business between the British government and the Talpur Mirs, but it ended unsatisfactorily. The agent resided from time to time at Tatta, Shahbandar, or Karachi, and endured numerous indignities, until at length he received a peremptory order from the Mirs to quit their territory. The East India Company took no notice of this insult. In 1809 an arrangement was effected between the Mirs and the British authorities, mainly for the purpose of excluding

Frenchmen from settling in Sind. In 1825 the Sindhi tribe of Khosas made incursions into Cutch, and a military demonstration became necessary as a preventive measure. In 1830 Lieutenant (afterwards Sir Alexander) Burnes, after many delays and threats on the part of the Mirs, was permitted to follow up the course of the Indus, taking with him presents from the King of England to Ranjit Singh at Lahore. The river was then entirely unexplored, and the obvious object of the mission was the collection of information for political purposes. Two years later Colonel Pottinger concluded a treaty with the Mirs for the advancement of commerce, by which traders and merchants were permitted to use the roads and rivers of Sind, though no Englishman might settle in the country. The Khairpur Mirs ratified this treaty, after their kinsmen at Haidarabad. In 1835 Colonel Pottinger obtained leave to survey the sea-coast of Sind and the delta of the Indus, yet trade did not enter the river, and the Mirs clearly mistrusted the intentions of their powerful neighbours. In 1838 the first Afghan War necessitated the despatch of British troops to join the main army by way of the Indus, in spite of a clause in the treaty expressly forbidding the employment of the river as a military highway. Lord Auckland considered that so great an emergency overrode the text of the agreement, and declared that those chiefs who showed themselves unwilling to assist us in such a crisis would be deprived of their possessions. In December of that year a large force under Sir John Keane landed in Sind, but found itself unable to proceed, owing to the obstacles thrown in its way by the Mirs in not supplying stores and carriage. After a threat to march upon Haidarabad Sir John Keane at length succeeded in continuing his course. Owing to this hostile demeanour a reserve force was despatched from Bombay in 1839, to take up its station in Sind. The Baluchi garrison at Manora, near Karachi, endeavoured to prevent it from landing, and the British accordingly found it necessary to occupy that fort. A treaty was afterwards concluded with the Haidarabad Mirs, by which they agreed to pay twenty-three *lakhs* to Shah Shuja, in commutation of all arrears of tribute due to the Afghans; to admit the establishment in Sind of a British force not exceeding 5000 men, the expenses being defrayed in part by the Mirs themselves; and finally, to abolish all tolls upon trading boats on the Indus. The Khairpur Mirs concluded a similar treaty, except as regards the subsidy. The English then took possession of the fort of Bukkur, under the terms of the engagement. By careful conciliatory measures the British representatives secured the tranquillity of the country, so that the steam flotilla navigated the Indus unimpeded. Nur Muhammad, senior Mir, died in 1841, and the Talpur government passed to his two sons, conjointly with their uncle, Nasir Khan. In 1842 Sir Charles Napier arrived in Sind, with sole authority over all the territory on the Lower Indus. New conditions were proposed to the Mirs, owing to delay in payment of the tribute, the terms including the cession of Karachi, Tatta, Sukkur, Bukkur, and Rohri. After some delay and a slight military demonstration the treaty was signed in February, 1843. But the Baluchis composing the Sindian army did not acquiesce in this surrender of independence, and shortly afterwards they attacked the Residency, which stood near the Indus, a few miles from Haidarabad. Major Outram and his small suite, after defending the building for a short time, found themselves compelled to retreat to a steamer then lying in the river. He soon after joined Sir Charles Napier's force. On the 17th of February Napier found the Mirs' army, 22,000 strong, posted on the Fuhli River, near Mecanee (Miani). He gave them battle with only 2800 men of all arms and twelve pieces of artillery, and gained a complete and brilliant victory. The British loss amounted to about 5000 men, while that of the British did not exceed 257, of whom nineteen were

officers. Shortly after the chief Mirs of Haidarabad and Khairpur surrendered as prisoners of war, and the fort of Haidarabad was captured, together with the Mirs' treasure, computed at about £1,000,000 sterling. In March Napier received reinforcements from Sukkur, and went in search of the enemy with 5000 men. He found the Baluchi army, 20,000 strong, under Sher Muhammad of Mirpur, in a strong position near Dabo. After a desperate resistance the Sindians fled in disorder, their leader, Sher Muhammad, retreating to the desert. Soon afterwards the British troops occupied Mirpur and Umarmot. Sind was declared a conquered country, and annexed to the British dominions. The Talpur family thus ceased to be a ruling power, after a sovereignty of fifty-three years. The Mirs were removed successively to Bombay, Poona, and Calcutta; but in 1854 Lord Dalhousie allowed them to return to Sind and take up their residence at Haidarabad. Under the Talpurs the government of Sind consisted of a rude military feudalism. The Mirs themselves had little education or refinement, and lived in primitive Baluchi simplicity, their extravagant propensities being shown in their fondness for horses, arms, and field sports. Their sole aim was to hoard up wealth, oppose all improvements, and enjoy themselves after their own fashion.

Immediately after the annexation Sir Charles Napier was appointed the first British governor, while a pension of 3½ *lakhs*, together with lands in *jagir*, were distributed among the deposed Mirs. The judicial and revenue systems underwent a speedy remodelling, and the province was divided into extensive collectorates. Since the British annexation the chief events in Sind have consisted of great commercial improvements, including especially the immense harbour works at KARACHI, which have rendered the modern capital one of the most important seaports of Western India. Under the commissionership of Sir Bartle Frere (1851-59) the province took most important steps in the direction of mercantile progress, and at a later date the construction of the Indus Valley Railway, from Karachi to join the Punjab line at Multan, contributed greatly to the prosperity of the country.

SINE and **COSINE**, two of the principal trigonometrical functions. Let $\angle A$ be any angle. Then taking any distance (AC) along one of its legs, let a circle (BCD) be struck with that distance for a radius. From C let fall CE



perpendicular to AB . Then, in geometry, CE is the sine of the angle $\angle A$, and BE is its cosine. In algebraical trigonometry ratios are always used, and the sine is the ratio of CE to AC , the cosine that of BE to AC ; or as usually abbreviated,

$$\sin A = \frac{CE}{AC}; \quad \cos A = \frac{BE}{AC}$$

As both sine and cosine bear an invariable relation to the radius, for the same angle, whatever the length of the radius may be, it is evident that they form a ready means of measuring an angle. The study of these and other functions of an angle is the main work of trigonometry, which, as it is rather the science of angles than of triangles, would be much more appropriately styled *goni-*

ometry. The cosine of an angle is identical with the sine of its complement (the difference between the angle and 90°).

SIN-EATING was an aboriginal superstitious custom of the Welsh border, notably in Herefordshire. It cannot better be described than in the words of Aubrey ("Remains of Gentilisme and Judaisme," Lansdowne MS., British Museum, published by the Folk-lore Society in 1883), who observed it himself at the time of the Restoration, and gives several examples of even later date in the mid-seventeenth century. "I remember," says he, "one of these Sin-eaters; he was a long, lean, ugly, lamentable, poor Raskal, and lived in a cottage on Rosse highway. This custome [of sin-eating], though rarely used in our dayes [that is, in Charles II.'s time], yet by some people was observed in the strictest time of the Presbyterian government, as at Dynder," and other places which he then quotes. He gives this as the meaning and method of the usage—"In the County of Hereford was an old custome at Funeralls to hire poor People who were to take upon them the Sinnes of the Party deceased. The manner was that when the Corps was brought out of the House and layd on the Bier, a Loafe of Bread was brought out and delivered to the Sinne-eater, over the Corps, as also a mazar-bowle of maple full of Beer, which he was to drink up, and sixpence in money; in consideration whereof he took upon him *ipso facto* all the Sinnes of the defunct, and freed him or her from walking after they were dead. This custome alludes, methinks, something to the Scape Goate in the Old Lawe (Levit. xvi. 21). I believe this Custome was heretofore used all over Wales."

In our own day we must of course go further afield for survivals of ancient superstition. We find the custom of sin-eating therefore now driven back into Central Asia. "One poor old man seemed constantly engaged in prayer. I was told he was an iskatchi, a person who gets his living by taking on himself the sins of the dead, and thenceforth devoting himself to prayer for their souls: he corresponds to the Sin-eater of the Welsh border" (Schuyler's "Turkistan," 1876). An interesting letter from Bagford, dated 1714, is given in Leland's "De Rebus Britannicis Collectanea," published in 1715 (Leland himself was antiquary to Henry VIII.), and records the custom of sin-eating as prevalent not long before that date (1714) "in the memory of our fathers, in Shropshire and in villages adjoining to Wales." He refers to Aubrey as an authority, and his description is much the same, with the addition of the formula spoken by the sin-eater, that after his symbolical meal he "pronounced, with a composed gesture, the ease and rest of the soul departed, for which he would pawn his own soul." Kennet, bishop of Peterborough in 1718, notes upon the margin of Aubrey's MS., "It seems a remainder of this custom which lately obtained at Amersden, in the county of Oxford, where at the burial of every corpse one cake and one flaggon of ale, just after the interment, were brought to the minister in the church porch." May not our "funeral baked meats" arise from the same custom? It is noted by Hayward (1599) as a refinement of cruelty that Richard II. was persecuted even after his death; for his body was "obscurely interred, without the charge of a dinner for celebrating the funeral."

SINES, CURVES OF, are those curves whose equation is $y = \sin x$, it being understood that x stands for as many angular units as there are linear units in the abscissa. The undulatory form of these curves is easily established, and if the ordinate of the curve consists of several of them as in the equation $y = a \sin x + b \sin 2x$, the several parts of such a compound ordinate may be put together in the same manner as waves or other undulatory forms are compounded of simple elements. See **WAVE**.

Curves of Cosines only differ from curves of sines in that the cosine, not the sine, is used in the equation.

SINES, LAW OF, that law of refraction by which the sines of the angles of incidence and of refraction bear a constant ratio to one another for the same media. See **REFRACTION OF LIGHT**.

SINEW. See **TENDON**.

SINGAPORE is an island and a British possession in the East Indies, included in the **STRAITS SETTLEMENTS**, and situated at the southernmost extremity of the Malay Peninsula. The island has an elliptical form, and is about 25 miles in its greatest length from east to west, and 15 miles in its greatest width. It contains an area of about 206 square miles. It is divided from the continent of Asia by a long and narrow strait called Salat Tabrao or the old strait of Singapore, which is nearly 10 miles long, and varies in width from 400 yards to 2 miles. At its western extremity, near the island of Marambong, it has only a depth of $2\frac{1}{2}$ fathoms, but further east it is nowhere less than 5 fathoms deep. This strait was formerly navigated by vessels bound for the China seas, but the advantages which the Straits of Singapore offer for a speedy and safe navigation are so great that it has not been used since they became known. The last-mentioned straits extend along the southern coast of the island of Singapore, and the most navigable part lies within the British possessions.

Surface and Climate.—The surface of the island is gently undulating, here and there rising into low rounded hills of inconsiderable elevation, the highest of them (called Bukit-Tina or the Tin Hill) being about 1200 feet above the sea. When it was first occupied by the British it was entirely covered with a forest composed of different kinds of trees, five or six of which are well adapted for every object of house-building. The soil of the interior is composed of sand and clay iron-stone, mixed with a large portion of vegetable matter, which gives it a very black appearance. Near the coast are some low tracts, flooded daily by the tides, and there is a general tendency to the formation of swamps. Rivulets are numerous, but they are of inconsiderable size, and the water is very bad.

The climate is hot, but equable and healthy, the seasons varying very little. The atmosphere throughout the year is serene. The smooth expanse of the sea is scarcely ruffled by a wind; but the tides and runs are more irregular than in most parts of the East.

Products, Animals, &c.—Singapore is not rich in agricultural productions. No part of it was cultivated when the British took possession, and at first the soil was considered ill adapted for agricultural purposes. But considerable tracts near the town have been cleared by the Chinese, who have succeeded in cultivating different kinds of fruits and vegetables, catechu, rice, coffee, sugar, cotton, and especially pepper and the betel-vine (*Piper siriboa*). Tropical fruits and vegetables grow well.

The animals of Europe have been introduced, but most of them are few in number, as pasture grounds are scarce. The Chinese, however, keep a great many hogs. Tigers swam in the jungles, occasionally committing great havoc, and, indeed, according to a recent authority, carry off from 200 to 300 persons annually. The wild cat, otter, flying-squirrel, ferret, porcupine, pangolin, sloth, wild hog, several kinds of monkeys, bats, especially the flying-fox or teropus, several varieties of rats, two peculiar species of deer, and two small specimens of the ox tribe, are native; the dugong abounds on the shore. The birds comprise falcons, owls, various species of pea-fowls, pheasants and partridges, pelicans, herons, woodpeckers, paroquets, Java sparrows, &c., with many varieties of wading birds, but the web-footed species are rare. Among reptiles are turtles (both plentiful and cheap), tortoises, crocodiles, the black cobra, and other varieties of serpents. The coast and rivers abound with fish—soles, mullets, rays, sharks, &c.; and crabs, prawns, and other crustacea are abundant.

SINGAPORE, the chief town, stands on the southern shore of the island, on a level and low plain of inconsiderable width, forming the harbour. It extends several miles along the shore, but only a thousand yards inland, where it is inclosed by hills from 100 to 150 feet high. The commercial portion occupies the most western extremity, and is separated from the other parts by a salt creek, called the Singapore River, which is navigable for small craft. A bridge connects it with the eastern part, which contains the dwellings of the Europeans, the public offices, and the military cantonments. Contiguous to this portion of the town is the government-house, which is built on a hill. The most eastern part is occupied by the Malays and Buzes, and is squalid and filthy. The whole of the warehouses and all the dwelling-houses in the principal streets in their vicinity are built of brick and lime, and roofed with red tiles. The higher classes of the European and American merchants generally live in bungalows or garden-houses in the suburbs, and along the beach east of the town, which commands fine views of the harbour and its entrance. Ships lie in the roads of Singapore at the distance of from one to two miles from the port, according to their draught. The harbour is safe, easy of approach, and will admit the largest vessels. It possesses wharves, warehouses, graving-docks, and every convenience. The principal public buildings at Singapore are the government-house, a court-house, a town-hall, a cathedral, a gaol, custom-house, mission chapel, and the Singapore Institution, founded by Sir S. Raffles for the cultivation of the languages of China, Siam, and the islands of the Malay Archipelago. There are also several native schools, a lunatic asylum, and an hospital for lepers. The general appearance of the town is of a mixed European and Oriental character; but the streets are generally wide, well paved, and lighted with gas; and the sanitary arrangements are well attended to. There is also an efficient system of police. A botanical garden has lately been formed. Singapore is 1470 miles from Point de Galle, in Ceylon, and 1699 miles from Calcutta. It is one of the principal stations of the Peninsular and Oriental Company's steamers. Its population is about 125,000, nine-tenths of the number of inhabitants in the whole settlement. Since 1804 the town has been very strongly fortified.

Singapore has become the London of Southern Asia in the Indian Archipelago, and a great centre of exchange for the productions of the Old and New Worlds. All the nations that inhabit the countries bordering on the Indian Ocean resort to it with the produce of their agricultural and manufacturing industry, and take in exchange such goods as are not grown or produced in their own districts. They find there a ready market, which at the same time is well stocked with European goods. The effect has partly been produced by the wise policy of declaring the harbour of Singapore a free port, in which no export or import duties, except anchorage, harbour, and lighthouse fees are levied.

The value of the imports and exports from and to all countries sometimes amounts to £26,000,000 a year. There being no customs duties, the revenue of the settlement is raised by direct taxes and excise duties, the amount being generally slightly in excess of the expenditure.

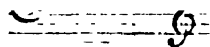
Singapore is the chief of the Straits Settlements, which were transferred from the control of the Indian government to the Secretary for the colonies in 1867.

History.—Singapore is celebrated in Malayan history as having been the first place of settlement of the early Malay colonists from Sumatra. Their location here took place towards the middle of the twelfth century, and the lines of the ancient town of Singapore (*Singapura*, or city of the Lion) were still traceable in 1819. For centuries before 1811, however, the island seems to have been unclaimed by any power. In that year it was formally annexed to the

territories of the Sultan of Johore. Its splendid position, on the maritime highway from India to China, induced Sir Stamford Raffles to endeavour to obtain possession of it for the East India Company, and permission was given to erect a British factory on it in 1819. The population then only consisted of about 150 individuals, mostly fishermen and pirates, who lived in a few miserable huts. In 1824 Mr. Crawford purchased for the East India Company the sovereignty and fee-simple of the island and every islet within 10 miles of it, for £13,500 and an annuity of £3780. The progress of the settlement has been exceedingly rapid since it came into the possession of the British. In 1822 the population had increased to 10,000 persons; in 1836 to 30,000; in 1850 to 65,000; and in 1886 it was estimated at over 120,000—of whom 2770 were Europeans, 86,000 Chinese, 22,000 Malays, and 12,000 Indians; and the population is probably the most heterogeneous in the world, comprising as it does nearly twenty nationalities, speaking different tongues. The Malay is the prevailing language, and the recognized medium of communication between all the residents. The Europeans and Chinese constitute the wealthier classes. The former are for the most part merchants, shopkeepers, and agents for mercantile houses in Europe. Most of the artisans, labourers, agriculturists, shopkeepers, and native merchants are Chinese. The Malays are chiefly occupied in fishing, collecting seaweed, and cutting timber, and many of them are employed as boatmen and sailors.

SINGING is the musical use of the human voice. In the article **ARYTENOID CARTILAGE**s the different use of the larynx for singing and speaking is explained, and the general structure of the **LARYNX**, which is the organ of voice, is given in the article under that heading.

The human voice is an instrument of very variable compass. Some voices have but about an octave of musical notes, others have twice as many, exceptional voices have two and a half or even three octaves. Singing voices are divided into the high soprano and the deep contralto of women and boys, between which comes the voice very common in England, and called mezzo-soprano; alto, usually a falsetto male voice, but occasionally a true voice; and the high tenor and low bass for male voices, between which comes the ordinary English male voice, the barytone (or baritone). As to the range of these voices Mozart has left it on record that Agujari the soprano could sing from *a* up to *c'''* in *altissimo*, three and a quarter octaves. Contraltos of deep register can frequently sing as low as bass *c*. Tenors of finest voice reach the high *c''* in the middle of the treble stave, and basses not unfrequently touch *B* below the bass stave. The Russian Cathedral basses form almost a class apart, and there contrabassi are found who reach *AA*, and even *GG*, below the bass stave. Such a bass was singing in London in the present generation. From this note to the high *c'''* of Agujari is about five and a half octaves, surely a remarkable compass for so small a musical instrument as the voice.



Russian Basses. Agujari in 1770 (teste Mozart).

Many of our great sopranos have had nearly three octaves compass, such as Maria (*g* to *e'''*), Banti (*g* to *g''*), Catalani (*g* to *g'''*), Mrs. Billington (*a* to *a'''*), Carlotta Patti (*g* to *e'''*).

The usual range is, soprano, *c'* to *a''*; contralto, *g* to *d''*; tenor, *d* to *a'*; barytone, *B* to *e'*; and bass, *F* to *d'*. Tenor music is usually written in the treble stave, an octave higher than the true sounds.

The change in musical composition from brilliancy to intensity has had a disastrous effect upon singing considered as a display of vocal (as distinguished from musical) ability. There are few singers now who can properly render the florid vocal music of past generations. This music, though not really fine in itself, was so effective and so enormously difficult that it necessitated long and arduous study. Modern recitative-like compositions, where all the colouring is given over to the orchestra, not only do not demand such skill in vocal dexterity, but absolutely prevent its exercise. Consequently it is rapidly becoming a lost art. Another reason for the temporary decay of really fine singing is the overstraining of numbers of voices in chorus singing. The practices of choral societies are too long and too arduous, and the singer's inevitable tendency to sing loud that he may hear his own voice is sure to lead to undue exertion. The evil is intensified by the noisy orchestras, which are the ruin of large modern concerts, so that the performances of great works degenerate into an ignoble contest between the blaring trumpets and the shouting choristers. The more musicianly among the conductors are already beginning to alter this and to care for their voices. Much attention is paid to the physiology of singing. Nevertheless there is every reason to believe that a new school, that of purity of tone and expression, will arise on the ruins of the former, and it is to be hoped that the later singing will outshine the earlier style in good time.

It is doubtful, however, whether more than a scientific interest can attach to the great study of the larynx and the throat and mouth when engaged in singing which mark these later years. The excellent treatise, sensible, readable, and popular, of Dr. Morell Mackenzie on the "Hygiene of the Vocal Organs" (London, 1886), is among the best of such works; and a more professionally musical view of the physiology of the subject is taken in the elaborate "Voice, Song, and Speech" of Messrs. Lennox Browne and Emil Behnke (London, 1883). When Porpora trained the great Caffarelli, teaching him to sing one and the same piece of music for five or six years, and dismissing him when at last he had mastered all its difficulties with the words, "Now, *caro mio*, you are the greatest singer in the world," the famous maestro knew nothing and would have cared less about the anatomy of throat or chest. He was a profound musician; he had heard the best vocalists of that or any age; this he thought sufficient for all purposes. Modern singing masters not unfrequently write with great learning about the laryngoscope, the vocal cords, glottis, and pharynx. Somehow they do not produce a Caffarelli.

A singing master who is thoroughly and practically acquainted with the anatomy and physiology of the parts over which he is to give his pupils control, his other qualifications being equal, is in a position to produce better results than one who is deficient in such skill; but his other qualifications, such as artistic taste and feeling, a fine ear, and large experience, are infinitely more important than the profoundest scientific investigations.

The application of physiology to the vocal art is practically identified in this country with the researches of one of the foremost singing masters now alive, Signor Manuel Garcia; elsewhere it dates back to a much earlier period. Dr. Fabrizio Aquapendente, professor at Padua about 1500, was the first to place the theory of sound production by the vocal organs on a rational basis. His researches were further developed by Denis Dodart, physician to Louis XIV., who in 1700 read a treatise on the functions of the glottis to the Académie des Sciences, and was in his turn superseded by Antoine Perrerin, author of the essay "De la Formation de la Voix de l'Homme" (1741), who seems to have started the so-called "string theory," according to which the vocal ligaments are analogous to the strings of

a bowed instrument, the tone being raised by means of shortening them. Infinitely more important than all these theories were the practical researches made by Manuel Garcia by means of the LARYNGOSCOPE. At the same time, if we are to aim at a scientific examination of the art of singing, it must be truly scientific and not pseudo-scientific. The absurd jargon written and taught by musicians, learned only in their own art, as to the proper mode of production of the voice is certainly speedily doomed to disappear.

The larynx is the organ of voice just as much as the eye is the organ of sight, or the ear of hearing. Every one would laugh at a man who should pretend to smell with his lips or see with his fingers; yet such claims are not one whit more absurd than those of singers who profess to fetch their voice from the back of the head, the roof of the mouth, the bottom of the chest, or anywhere else that their misinterpreted sensations lead them to fancy.

The act of taking breath, in a musical sense, is a more complicated process than would appear to the outsider, and many theories have been stated and are at the present moment held on the subject. The combined power of midriff and of rib breathing undoubtedly constitutes the right way, and collar-bone breathing is totally wrong and vicious, and should not in a state of health be made use of under any circumstances. When enlarging our chests by the descent of the midriff and by sideways extension of the ribs we inflate the lungs where they are largest, and where consequently we can get the largest amount of air into them. When expanding our chests by raising the shoulders and the collar bones, &c., we inflate the lungs where they are smallest, and where consequently we get the smallest amount of air into them.

The rules laid down by physiologists as to the kind of food and drink most beneficial to the voice may be excellent in their way, but it is doubtful whether they will be adopted to any large extent. Take, for instance, the familiar medical prohibition of supper to all singers but those of exceptional digestive powers. To most vocalists supper is the most important meal of the day. They, as a rule, dine very early—some of them do not dine at all on the days when they have to sing. Can they be expected to retire to bed after supreme efforts in a state bordering on starvation?

Singers are a most superstitious race, and most of them have some panacea of their own to which they attach implicit faith. A famous operatic tenor took sips of champagne in the intervals of acting; another great artist, a lady, used to believe in the supreme virtues of stout; oysters, a raw egg beaten with sugar, slices of cucumber, &c., are some of the things named among the innumerable eccentric remedies resorted to by singers.

The most musical of ordinary languages for singing is the Italian, whose numerous broad *a* sounds (the best vowel for singing on) and frequent vowels and labials, and whose freedom from very harsh consonants, make it the singer's favourite tongue. Next it comes the Latin of the Roman Catholic Church services, pronounced Italian fashion. If it were not for our unfortunate excess of STIMULANTS (elsewhere explained) English would come next without dispute, in spite of an occasional plethora of consonants. As it is, French, although possessing many very disagreeable nasal sounds (witness Victor Hugo's "*Quand tu chantes*," a vile phrase for a singer), must take precedence of English because of the practice of French singers, as with all French poetry, to pronounce the final *e* so common in that language, but which is mute in ordinary speech; consequently consonants are cut isunder, and the words have an easy flow. German is unquestionably vocally the worst language of those named. If Schumann's "*Ich grolle nicht*" were but in Italian, and set

to words of equal power, it would be much better for the singer. But a fine singer will sing finely in any language, and the more especially if he articulate his words well. This simple accomplishment is acquired by very few singers. Those who have heard Stockhausen sing one of Schubert's best *lieder*, or Madame Sainton-Dolby sing one of our native ballads, can realize of what English and even German are musically capable.

SINGING FLAMES. When a small flame burns within a tube, a musical note is produced which is the proper tone of the tube. This fact, as to a hydrogen flame, was discovered by Huggins in 1777, and was at once set down to the pulsations caused by the contraction and expansion of the aqueous vapour produced by the combustion of the hydrogen. The explanation was overthrown by Faraday, who simply showed that any flame whatever would produce the same result, coal-gas for instance, if treated in a proper manner. Faraday considered that all gas flames were attended with feeble and rapid explosions, and these gave the flutter of tuneless sound which the pipe rapidly brought into order and caused to become rhythmical with its own proper vibration-rate. A huge rose-burner placed within a long pipe (15 or 20 feet long) can be made to give forth a sound of great power, which will shake a room with its vibration. If now the pressure be increased, the tone increases to a certain point, at which the reaction of the forcible waves is so great as to extinguish the flame with a noise like a pistol. If on the other hand the flame is reduced, the sound diminishes and then ceases; but after a pause the first harmonic (the octave) is heard; and a still further reduction produces the second harmonic (the Twelfth to the prime tone). A common house-chimney is such a long pipe, and the roar of a flaming fire is simply a rough attempt at a musical tone. Without going to this extent, but using small tapering flames and tubes of ordinary lengths, singing flames are quite easy to produce. Indeed musical instruments, more or less satisfactorily, have been made of such materials; these are the *pyrophones* or *flame-organs*, &c., which periodically appear. They are curious as scientific toys, but are of no value as musical instruments.

Professor Tyndall has shown the real cause of singing flames, by catching the image of the flame when singing on a rapidly rotating mirror, when it is at once seen that instead of a continuous band of light, small detached images of the flame are reflected. It thus appears that the flame is extinguished by its own sound-waves, and is relit by the hot air, and it is not difficult to show by means of suitable apparatus that the flame extinguishes and relights itself once for every vibration. Thus to produce the note we call *c'* (or "pitch *c'*"), the *c'* in the middle of the treble staff, a singing flame would flash and die 528 times in every second. It has been said above, that the pitch of the note depends upon the length of the pipe, but in practice this is not precisely the case; the size of the flame affects the pitch to a small extent and within limits. Too large a flame will not sound at all; too small a flame sounds the harmonic, and the smaller the flame the higher the harmonic produced.

A small silent flame, suitably placed, may be made to sing either by another singing flame, or by the voice or any other musical sound; but if the generating sound be very loud, it will be extinguished by the force of the sound-waves. Also by producing a sound of different phase from the first, a flame which has been made to sing may be reduced to silence by the continued interference with its vibrations. The article **SENSITIVE FLAMES** may be referred to with advantage in connection with this subject.

SING'SPIEL was the general term in Germany for a musical drama, whether a melodrama, an opera comique, or a grand opera; that is to say, whether the music was a subordinate, an equal, or a dominant element. But though

Mozart called the "*zauberflöte*" (magic flute) a singspiel the term opera (Ger. *oper*) has long replaced the older phrase, and the term singspiel is now regarded as limited to plays enriched with music. It is therefore exactly the converse of the opera comique (or operetta), which may be defined as an opera with dialogue interspersed.

SINIS or **SIN'NIS**, a personage of the ancient Greek mythology, often referred to by our poets, like his fellow in barbarity, Prokrustes. The method Sinis adopted with his victims after robbing them was to fix them to the top of a fir tree which he had bent, and which, when let go, hurled them aloft into the air. His hunting-ground was the isthmus of Corinth. The hero Theseus destroyed him by means of his own device.

SIN'ISTER gets its evil meaning from the ancient customs of augury. It is merely the Latin *sinistrum*, to the left hand; but as birds flying or singing upon the left hand were regarded as evil omen, sinister and inauspicious were one and the same thing. Our countrymen often think it unlucky to hear a raven croak upon the left hand, and *corra sinistra* is quoted as of evil omen in the Latin poets. So long do superstitions persist!

In heraldry *sinister* means the right-hand side of a shield or coat of arms, because the shield is regarded as being borne by a knight, whose left side would naturally be opposite the right hand of the spectator.

SINKING FUND, an almost invariable part of a modern government loan. The principle is roughly this: the borrowing state engages to pay the lenders as a body so much money a year, and of this gross sum a certain part goes to pay interest, and the remainder to pay off as much of the loan as it will serve for at par, or at a rate per cent. fixed at the date of the loan. Of course in the first year the great bulk goes for interest; but with every year the bulk of the loan is reduced by the sinking fund, and the less interest is payable the more money is available for the sinking fund. Thus the debt would sink at an increasing rate, slowly at first, but very rapidly at last, until it was quite extinguished. A sinking fund is in fact an investment in the loan itself at compound interest; and as an example, to make the matter clear, it may be here said that a 5 per cent. loan on which the borrowing government has agreed to pay 1 per cent. extra as a sinking fund—that is, has agreed to pay 6 per cent. on the total loan annually, taking interest and sinking fund together—would be entirely paid off in a little less than thirty-seven years.

Sometimes, instead of paying off bonds to the holders in the manner above shown, and according to the rate agreed upon at the issue of the loan, a government will start a sinking fund after a loan has long been issued, and go into the market to buy its own bonds. A very common result is that such a government will use all its enormous powers to "bear" the market just before it means to purchase, so that it may get as much relief for its money as possible. Spain has in this way bought for 15 per cent. bonds which her creditors a very short time previously had bought of her for about 30.

The English sinking funds which our chancellors of the exchequer start from time to time, with a view of reducing on some sort of system the vast overgrown dead-weight of the national debt, generally take the form of terminable annuities. The government sells certain terminable annuities, that is, it undertakes for a sum paid down to pay a yearly sum for so many years and no longer; and the money received from the annuitants is used to cancel its value in the funds. The annuities form a yearly charge in the estimates till they work themselves out as arranged.

In all these systems the danger exists of some sudden danger or necessary outlay arising—whereupon the first thing a minister, at his wife's end for money, is sure to turn to as a resource, is a *temporary* (it is always a "merely

temporary") suspension of the sinking fund. Another source of danger to a sinking fund is the difficulty of raising taxes in hard times. Thus a proposal of Sir Robert Walpole's, in 1716, to get rid of the national debt in this manner, which was taken up and developed in a thoroughly workable manner by William Pitt in 1786, seventy years later, eventually (1807) took the form of setting £1,000,000 aside annually to be allowed to increase at compound interest till it could abolish the debt; but it failed, for the simple that in hard times the taxes were unproductive and the money hard to be borrowed. Borrowing money to save is suicidal, and the fund soon came to an end in consequence. It would have been simpler and equally efficacious to pay off the £1,000,000 a year instead of trying to save it up. A new sinking fund was set up under George IV. in 1823, but this too succumbed in a few years to the temporary needs of impecunious chancellors. In 1875 the most recent attack of the kind was made, still upon Pitt's basis of the extra £1,000,000 per annum, but expended by way of terminable annuities, &c., instead of being saved. The operation of this fund has been most beneficial. If nothing happens to check it, the great debt will be reduced in this manner, by the end of this century, by no less a sum than £150,000,000, as well as what may be done with surpluses on the budget or any other windfalls.

SINON, one of the characters in the Trojan War, has become almost a type of the deceiver who scruples at no low cunning to achieve his ends, and trades upon the best sentiments of men. He was a relation of Ulysses (Odysseus) according to Virgil (*Æneid* li.), and was the means of the success of that arch-schemer's design for the taking of the town. The Greeks having set sail by pretence, Sinon allowed himself to be found by the Trojans apparently much injured with self-inflicted wounds. These he said were due to the cruelty of the Greeks, his comrades, who had then purposely left him behind to perish, for reasons which, as he gave them, seemed plausible. In revenge, as he made out, he confided to the Trojans that the great wooden effigy of a horse left by the Greeks on the shore was an atonement to Minerva (Athena) for the insult Ulysses had put upon the goddess when he polluted her sanctuary in Troy and carried away the palladium on which the safety of Troy depended. Sinon therefore counselled the Trojans to secure the favour of the goddess, and possibly ultimately the victory over Europeans, by dragging the horse within the gates. This was done, a breach in the walls being made: and in the dead of night Sinon let out the Greeks concealed within the machine, and the foes of Troy were in her midst. The stratagem was perfectly successful, and Troy was in flames that very night.

SINOPE (Turk. *Sinoob*, *Sinoub*, or *Sinub*), a seaport town of Asia Minor, on the Black Sea, 75 miles W.N.W. of Samsoun. Population, about 10,000. It is situated on an isthmus connecting a high rocky peninsula with the mainland, and has on its south-west side the best port on the north coast of Asiatic Turkey. Its walls are ivy-clad and overhang deep wooded ravines, crossed by high and narrow bridges. Many of its buildings are surrounded by gardens. It has a dockyard and naval arsenal, and exports timber, salt, cordage, fish, and oil. Of the ancient city of Sinope, which was founded by a colony of Milesian Greeks, and for 200 years after the Peloponnesian War was almost the mistress of the Euxine, numerous ruins still exist—friezes, hundreds of Corinthian columns, capitals, inscriptions, and even statues, built up into the walls of its picturesque Byzantine fortifications.

Sinope was the birthplace of Diogenes, the famous Cynic philosopher. In modern times it is chiefly famous as the scene of a sanguinary naval engagement between the Turks and the Russians on the 30th of November, 1853. The Turkish squadron, consisting of thirteen ships, while lying

at anchor in the roadstead was entirely destroyed, owing, in some measure, to the sudden and unexpected attack of the Russians, and 4000 Turks were killed. The Russians also bombarded and nearly ruined the town.

SIN'TER (Ger. *sintern*, to drop), in geology, is the term applied to the hard and compact incrustations deposited round springs containing silica and lime in solution, to distinguish them from the more earthy depositions known as *TERA*. The flinty varieties are termed *silicious sinter*, and the limy varieties *calc-sinter*.

SINTOO'. See **SINTO**.

SINUS (Lat.), in anatomy, the depressions or grooves existent in various bones. The veins which traverse the cerebral *dura mater* are also called *sinuses*. The frontal sinuses are the large hollows of the forehead divided into two portions by a perpendicular bony partition, and lined with a continuation of the pituitary membrane, which secretes the mucus discharged into the nose. In what may be termed the lower types of man, such as the Papuan and Australian aborigines, no frontal sinuses are found.

SIOOT', SIOUT, or **SIUT**, written also *Osiot* or *As-siut* (anciently *Lycopolis*), is the principal town of Upper Egypt, capital of a province, near the Nile. The population is about 25,000. It is the largest and best-built town south of Cairo, from which it is about 200 miles distant; and has well-supplied bazaars, handsome mosques, a palace built by Ibrahim Pasha, public baths, a government school, and cotton factory. It is also an important military station, and has a large manufacture of pipe-bowls, great quantities of which are exported. Around it are traces of the ancient city an' in the adjacent mountains, west of the Nile are several remarkable tombs, grottoes, and catacombs. From the summit of these mountains there is the best view in Egypt over the valley of the Nile.

SIOUX' INDIANS, a former numerous and powerful tribe, inhabiting the country between the Missouri and the Mississippi, but now almost entirely confined to the Dakota territory. Some years since they were estimated to number 30,000, including 7000 warriors; but the entire tribe, men, women, and children, probably does not now contain more than the latter number—the advance of civilization and their frequent wars with the Chippewas having rapidly reduced them. They are generally very brave, and somewhat more civilized than the other Indians, Roman Catholic missions having been established among them, with a considerable degree of success, for more than two centuries. The Presbyterians have also worked among them in modern times.

SIPH'NO, called also *Siphanto* and *Sifanno*, an island in the Mediterranean, forming one of the group called the Cyclades, noted for its pottery. The original name was Merope. It was colonized by Ionians from Athens. In the reign of Polyxates, the tyrant of Samos, about 520 B.C., the inhabitants were very flourishing in consequence of their gold and silver mines, and, according to Herodotus (iii. 57), were the most wealthy of the islanders. Their mines were afterwards less valuable, and seem ultimately to have been wrought out.

Siphno is situated to the S.E. of Serpho, N.E. of Milo, and S.W. of Paro, lying immediately opposite Antipare. It is of an oblong form, and about 30 miles in circumference.

The population is about 5000. The soil is fertile, and the chief products are corn, silk, figs, wax, and honey. A good deal of the land, however, is laid out in vineyards; but the wine is not so good as that of the neighbouring islands.

SIPHON. See **HYDRAULICS**.

SIPHON BAROMETER. See **BAROMETER**.

SIPHONOP'ORA. See **HYDROZOA**.

SIP'ULOS (Lat. *Sipylus*), the modern *Sipili Dag*, is a mountain in Lydia, Asia Minor, of volcanic origin, a part

of the range of Tmôlos, the modern *Kisilja Musa Dagh*, and runs north-west beside the river Herinos. It was to Sipulos that the unhappy Niobê retired when robbed of her twelve children in one fatal hour by the arrows of the angry god Apollo and his sister; and here she wept incessantly, till at her prayer Zeus changed her into a rock. But this could not stop her grief, and stone though she was the water flowed from hidden springs or from the melting snows adown her rigid face. As Sophokles says in the "Antigone,"

On Sipulos, high ering
The Phrygian stranger sits
Whom Tantalos begat;
Hæ did the rugged rock,
Clinging as ivy clings,
Subdue and make its own.
The everlasting snow,
Which rests above, and melts,
Bedews the cliffs beneath
Those brows that ever weep."

Pausanias, a native of the country at the foot of Sipulos, tells of the appearance of the mountain cliff, like a weeping woman. Besides NIOBÊ, TANTALOS, her father, and PHÏLOS, her brother, are subjects of myths centring round Sipulos. In fact this seems likely to have been the original home of much of the admittedly composite Greek mythology.

SIPUNCULUS. See GYPHARIA.

SIR, now the mode of address to any respectable man, still retains the last of its ancient glories when used as a title, denoting that he to whose full name it is prefixed is either a baronet or a simple knight. It is, however, but the shortening of the imperial *Sire*, that is, lord; and is the same word with the French *Sire* and *Seigneur*, the Italian *Signore*, and the Spanish *Señor*. All of them come from Lat. *senior*, old man being those naturally entitled to reverence, and all the three forms, *Seigneur*, *Signor*, and *Señor*, are still used in addressing God Himself. As in the middle ages Sir was held to translate Dominus, and the higher graduates of the universities often bore the latter title, still surviving in the carded form of *Dons*, it came about that priests were often entitled Sir. It is in this way that we find Shakespeare's priests called Sir Hugh Evans, and the like. The French form, *Sieur*, once meaning lord, is now applied to very common men, not worthy the appellation *Monsieur*, which is given to any person of property, however poor. *Sieur* is in fact almost confined to the police courts, where *le sieur Hubot* would imply that the prisoner Hubot was of a very low class indeed.

SIRBONIS. See SERBONIAN BOW.

SIREN is a genus of ANTHURUS belonging to the section Perle branchiata, in which the gills persist throughout life. The genus is distinguished by having the form elongated, nearly like that of the eels; branchial tufts, three on each side; the fore limbs small, with four toes, but no claws; no any vestige of a pelvis; the head compressed, the gape of the mouth not wide; the muzzle obtuse; the eyes very small; the lower jaw armed with a horny sheath, and several rows of small teeth; the upper jaw toothless, but numerous small pointed teeth directed backwards occur on the palate.

Siren lacertina, a native of South Carolina, was first discovered in 1795 by Dr. Gairdner, who sent a description of it to Linnaeus, but its systematic position was first satisfactorily established by Cuvier. It is usually about 19 inches long, but grows to a length of 3 feet. The body is covered with a thick, soft, slimy skin of an olive or blackish colour. The tail is long, compressed, and margined above and below with a narrow fin, which assists it in moving through the water. The gills are placed on either side of the neck, and consist of short fleshy stalks bearing fringed branches. In addition to these gills the siren has long bag-like lungs.

The siren inhabits the marshy grounds of the Carolinas, especially those where rice is cultivated. It lives in the mud, from which it makes excursions, sometimes on land and sometimes in the water. It can swim rapidly in the water. From the swampy places by the sides of pools and under the overhanging trunks of old trees where it is found, it was called by the inhabitants the Mud Iguana. Its food consists of earth-worms, insects, &c.

SIREN, a philosophical instrument of great value in acoustics. Its function is to measure the rapidity of vibration per second of the sound which it is itself producing at the moment.

The simplest form of the siren is a thin disc of metal or card rapidly whirled by means of a whirling table. A pipe with a bent nozzle is directed over one of a series of holes in the plate, and a stream of air is directed through the pipe. As the plate revolves the holes pass the pipe, and tiny puffs of air pass through them, succeeded by silence when the substance of the plate between the holes is passing the end of the air pipe. A siren giving twelve puffs for each revolution could readily therefore be made to give 240 puffs a second (twenty revolutions), which would produce a faintish note nearly at the pitch of *b* below middle *c*. If a second pipe be at the same time directed to the inner circle, with eight holes, 160 puffs a second would be obtained, and the two sounds would form the interval of a fifth. A simple counting apparatus is therefore all that is necessary to find absolutely the number of puffs a second, and the siren is rotated more or less swiftly as required until the note of the desired pitch is attained, when the rate of revolutions per second is at once read off; this is multiplied by the number of holes round the circle in use, and the number of vibratory shocks given to the air, i.e. the number of sound-waves, per second is at once seen.

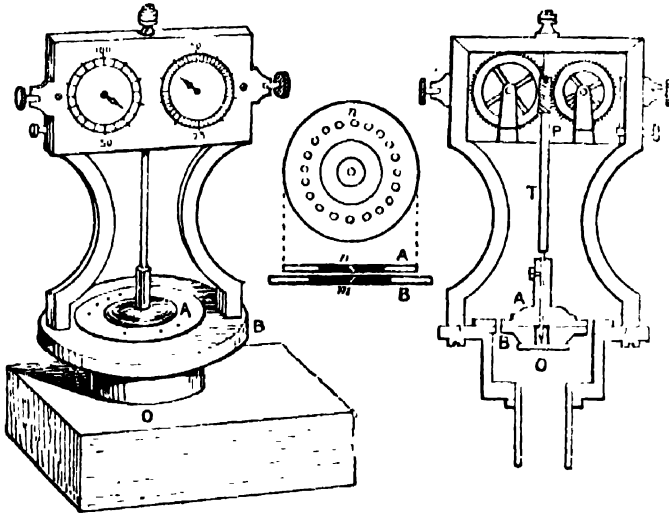
The siren of Cagniard de la Tour is a rather more ambitious machine, giving at once a much greater range of notes and a much stronger and clearer tone. The rotating disc is centred on the top of a wind chest, both being perforated in such a manner that the perforations of the one slant outwards and those of the other inwards. Air being forced into the wind-chest forces itself through the holes in the roof, and so through the further holes in the rotating disc, the number and position of the holes being the same in each series. By pressure against the sides of the holes in the disc, caused by the opposing slants of the two sets of holes, the current of air forces the disc to rotate, and with a good pressure of wind it is not difficult to get a speed of from fifty to sixty rotations a second. With a twelve-hole series this gives 600 to 720 vibrations per second, and since all the twelve holes are sounding at once by the construction of the machine, the tone is very considerably louder than that of the simple siren. If the stem of the disc be lengthened and fitted with an endless screw, it can be made to rotate a toothed wheel and measure its own rapidity very simply, the wheel advancing one tooth for every rotation.

Dove improved the siren by adding several rows of holes so as to play chords at will, the rows being controlled by stops which operated upon concentric rings lying between the rotating disc and the roof of the wind-chest. Each ring was pierced exactly like the circular series of holes immediately above it, so that if the stop brought it into play the holes of that circle were free for the wind to pass, but if the stop rotated the ring a little the solid part of the ring came under the holes of its circle and stopped them. Any series or all the series could be thus used at will.

Helmholtz still further elaborated the instrument by using two of Dove's Polyphonic Sirens as just described, supplying them from the same wind-source. Then by suitable apparatus he arranged so as to be able to place

the two sirens in any desired phase relatively to each other; for instance, that the two series of puffs should be simultaneous, or that the puffs on one siren should come exactly midway between the puffs of the other, &c. With this machine the varied and curious phenomena of "interference" and of "beats" are opened for investigation in a manner not otherwise possible. A simple appliance for rotating either siren by hand enables the experimenter to increase the rotations or to diminish them by one or two per second, and thus to throw the sirens out of unison and to make beats; and as every movement is self-measured, the greatest accuracy is obtainable in counting the beats and ascertaining the law of their production.

The name siren was given to this instrument by the Baron Charles Cagniard de la Tour when he invented it



Siren of Cagniard de la Tour.

in 1819, because it can be made to "sing" under water almost as well as in air, and the physicist amusingly likened it by consequence to the SIRENS of the Greek mythology.

The illustration of De la Tour's Siren given above shows the cylindrical wind-chest O resting on the wind-conduit, and at B is seen the fixed cap closing O above. A is the rotating disc pierced with a ring of equidistant holes n, the holes being bored, not vertically, but aslant in the thickness of the stuff, as shown in section at n (fig. 2). A precisely similar annular series of holes is bored in B, exactly beneath the series in A, differing only in the slant of the holes being the other way, as shown in section at m (fig. 2). The section of the whole instrument given in fig. 3 shows A and B arranged with the holes over each other ready to start. When the current of air rotates A the rod T fixed to it also rotates, and by its endless screw moves the wheel R one tooth forward at each revolution; R has 100 teeth, and one catch long enough to reach the teeth of a second wheel; the second wheel moves one tooth forward therefore for every 100 rotations of the disc A. The screws at the side throw the toothed gear in and out of running, so that the counting can be begun and ended at any instant. The indices shown in fig. 1 record the revolutions of the counters.

SIRENIA is an order of aquatic MAMMALIA. The body is fish-like, long, and cylindrical, terminating in a horizontal tail-fin. The fore limbs are flat, strong, and flipper-like, very flexible, and incased in skin. Hind limbs are totally absent in all except the extinct Halitherium, which had a rudimentary femur; but a rudimentary pelvis exists in all. The skin is dark, thick, and rough, sometimes hairless, sometimes sparsely covered with delicate

hairs. The muzzle is prominent, with the nostrils situated on it, and the lips are fleshy, fringed with short bristles. The eyes are very small, and there is no external ear. The bones are very solid, and one genus (*Manatus*) possesses only six cervical vertebrae, the fewest among mammals except a species of sloth, which has the same number. The skull is small, elongated, and truncated at either extremity. The teeth are of two kinds—incisors and molars—though in the extinct *Halitherium* some of the molar series appear to have had milk predecessors. The incisor teeth are wanting in the manatees (*Manatus*), but formed tusks in the manadugong (*Halicore*). The mammae are two in number, placed close to the armpits.

In this order are included only two living genera, *Manatus* (**MANATEE**, see Plate, fig. 1), with two species, and *Halicore* (**DUGONG**, fig. 2), with three. They frequent the estuaries of tropical rivers and the marshes of the coast, living on aquatic plants, grass, and seaweeds. A third genus, *Rhytina*, contains a single species, *Rhytina stellari* (fig. 3), which only became extinct in 1768. Fossil Sirenia are found in various Tertiary strata, the most interesting of which is *Halitherium*, from the Miocene of Europe. The evidence afforded by these fossil remains seems to connect the Sirenia with the Ungulata.

SIRENS (Gr. *Sirenēs*) are described in the "Odyssey" as maidens who sat by the sea, near the rock of Scylla, and so charmed with their music all who sailed by that they remained on the spot till they died. Odysseus (Ulysses), by the direction of Kikē, had himself tied to the mast, and stopped the ears of his companions with wax, by which means he was able to hear their music without succumbing to its influence.

Another legend of the Sirens is part of the Argonautic myth; and here they were outwitted by Orpheus, so that the Argonauts, having better music of their own, did not care to listen. Upon this they threw themselves in despair into the sea and were metamorphosed into rocks.

SIREX is a genus of Hymenopterous insects belonging to the family Uroceridae, which, together with the SAW-FLIES (*Tenthredinidae*), forms the section Terebrantia. The Uroceridae (tailed wasps or wood-borers) very nearly resemble the sawflies in form and appearance, but differ in the character of the ovipositor, which in these insects is formed for boring into wood, and consists of a serrated style grooved along its lower surface, and inclosed in a kind of sheath formed by two lateral pieces. The larvæ, too, resemble the grubs of beetles rather than the caterpillars of Lepidoptera, and have usually no pro-legs. The Great Tailed Wasp (*Sirex gigas*, fig. 1 in Plate HYMENOPTERA) is a common European species, and is well known in some parts of Britain, though it is not a true native, but was probably introduced in the immature state in timber. It is a large insect, the female often measuring about 1½ inch in length. Its general colour is black, but in the female the abdomen is reddish. This insect attacks pines and firs, the female boring into the wood to deposit her eggs. The larvæ, when hatched, bore deeper into the wood, and change there into pupæ; and the change into the perfect insect is also said to take place within the wood, the latter escaping by a passage left by the larvæ. A smaller species, *Sirex jurceus*, of a steel blue colour, occurs in Britain. Another species of the family is *Xiphydria camelus*, which attacks the beech, oak, willow, &c. The Corn Sawfly (*Cephus pygmaeus*) also belongs to the Uroceridae; its larvæ attack the stems of cereals.

SIRICIUS, Bishop of Rome, or Pope, born at Rome 324, succeeded Damasus in 384. His pontificate is very remarkable for two things. St. Jerome was writing the "Vulgate" at this time, and the Pope himself issued the first of those letters of discipline called "Decretals," on which so largely rest the forms and whole system of the Roman ecclesiastical polity. It was specially directed towards enforcing the celibacy of the clergy. It is significant of the division between East and West that while the East enacted creeds (Nicene creed, 325), the West enacted discipline. Siricius died 398.

SIRIUS and **PROCYON** (*Seirios, Prokion*), the Greek names of the bright stars in the constellations of the Great and Little Dog respectively; Orion's dogs, according to some, and those of minor personages, according to others. The whole of the mythic explanations form a proof that the constellations are not Greek in their origin. In a passage of Hesiod he has been supposed to speak of the sun under the name of Sirius, which means hot or scorching; and Hesychius defines the word to mean both the sun and the Dog-star. The Egyptians called the Dog-star Sothis, and from its heliacal rising had warning that the overflow of the Nile was about to commence. The overflow of the Nile follows the summer solstice; whereas, by the precession of the equinoxes, the heliacal rising of Sirius occurs at the present time about the 10th of August.

The greatest heats of summer generally follow the summer solstice, and in the Mediterranean latitudes, and in ancient times, it was observed that the unhealthy and oppressive period coincided with the heliacal rising of the Dog-star. We say the Dog-star without specifying whether it was Sirius or Procyon; it is uncertain which it was, and may have been both, for their heliacal risings do not differ by many days. The star itself was in Latin *Canicula*, which should seem to apply to the lesser dog, and Horace says—

"Jam Troezen fuit
Et stella vesani Leonis," &c. *Regulus*
Solis dies referente siroco."

All antiquity attributed an evil influence to the star; and though Cimon among the ancients, and Petavius among the moderns, thought that the effects were to be attributed to the sun alone, they had hardly any followers until the fall of judicial astrology. Even at this day, when the heats of the latter part of the summer are excessive, we are gravely told that we are in the Dog-days; and the almanacs, in which an absurdity seems permanently fixed and immovable, persist in informing us that the Dog-days begin on the 3rd of July and end on the 11th of August. Now, as the heliacal rising of Sirius takes place about the very end of this period, it is clear that it cannot be the cause of the pretended effects. Moreover, it is notorious that in our island the oppressive heats of the summer, during which dogs are frequently attacked by hydrophobia, generally fail about the middle or end of August. The real classical Dog-days are the twenty days preceding and the twenty following the heliacal rising of either Sirius or Procyon; but it is now useless to retain the period.

Sirius is a star of the first magnitude, and the most brilliant in the sidereal world. It is believed to be 286 (Sir John Herschel thought 400) times more brilliant than our own sun, when the enormous distance is taken into account. Its diameter is held to be seventeen times that of the sun, and its bulk 4860 times. Were it to be in the place of our own sun every creature in this earth would instantly perish, scorched by its immeasurable fires. Its distance from the earth is about 100,000,000,000,000 miles. It has a proper motion of an undulatory progressive nature, being drawn from its even path by a very faint star about seven seconds' angular distance away, equal to some 4,300,000,000 miles. M. Goldsmidt detected five other very faint companion stars to Sirius, and it seems not

unlikely that these may form a Sirian system. If so the Sirian planets are vast objects, for the one which most disturbs Sirius is at least 1000 times as large as our sun. Sirius is noticeable when low in the sky for its frequently changing colour, passing from red to pure green or sapphire blue in an instant, and then for rather a longer interval remaining white. Tennyson sings of Aiac and his brothers that

"As the fiery Sirius alters hue
And bickers into red and emerald, shone
Their morions, wash'd with morning, as they came."

And this prismatic glitter is of old date, for Homer himself compares the flash of the arms of Diomedes to the splendour of Sirius when "new risen from the waves of Okeanos."

Sirius used to be thought to be the nearest of the fixed stars, and moreover its distance was until lately usually given as 130,000,000,000,000 miles. But recent researches have pushed accuracy to limits undreamt of before. Several stars, three among them so small as to be invisible to the naked eye, are found to be nearer to us than Sirius; and the nearest star to us, Alpha Centauri (22,000,000,000,000 miles), is far less bright than Sirius. The old idea that brilliancy indicated nearness is now quite abandoned. The amount of proper motion observable in the stars, that is, their shifting of their place in the sky, is now received as the real criterion of distance. The greatest displacement of Sirius is now held to be perhaps equal to $\frac{1}{3000}$ part of the moon's diameter, but was formerly thought to be only $\frac{1}{2700}$ part; the first giving 80,000,000,000,000, the second 130,000,000,000,000 miles' distance. It seems reasonable to take an average of these extremes as representing the probable distance of the star. A combination of spectroscopic and astronomical observations has lately ascertained for us that Sirius rushes through space 33 miles a second.

SIROCCO, also called *Samiel* and *Simoon*, is the name given to a hot and suffocating wind which appears to originate with the rarefied air in the sandy deserts of Arabia, about the season that the overflowing of the Nile commences; it extends eastward over Arabia, Persia, and some parts of India, and is felt, but with less inconvenience, in Italy and Spain. This wind is probably only one of the modifications of that which, in different countries, is called the samoon, simoon, samm, or samiel, khamsin, and harmattan. All these occur most in districts which are at no great distance from sandy deserts, and they always blow from that quarter in which the desert is situated. The sand in the deserts of Africa and Arabia often becomes heated to 200° Fahr. to a depth of several inches. The air passing over this naturally becomes very hot, and a considerable quantity of fine sand is generally collected and carried by it. The winds affect the human body very powerfully, producing great feebleness and sometimes death. Formerly it was thought that they were pestilential, but this is not the case, although a putrid and sulphurous smell is sometimes perceived when they blow. It was also believed at one time that their injurious effects could be avoided by a person throwing himself on the ground with the mouth downward; but modern writers say that the Arabs disapprove of such a proceeding, and endeavour to diminish the hurtful effects by covering their faces with the *keffeh*, a handkerchief which they wear on their heads. The sirocco of Italy is not accompanied with sand, but is a hot moist wind—the latter quality being acquired in its passage over the Mediterranean.

SIS'KIN. See **ANERDEVINE**.

SISMON'DI, JEAN CHARLES LEONARD DE, born at Geneva, 9th May, 1773, was the eldest son of a Protestant minister of Italian descent, of the canton of Geneva. He was first placed at the college, where he acquired a sound knowledge of classical literature, and thence removed to the Auditoire (University), where he was enabled to pursue a more extended course of study.

His education being completed, he was compelled by change of fortune to enter as a clerk in the counting-house of the firm of Eynard & Co. at Lyons. The revolutionary troubles which overtook Lyons in 1792 compelled Sismondi to return to Geneva. This city, however, proved no asylum from political persecution; his father and himself were imprisoned, but as no charge could be brought against them, they were soon afterwards liberated. In February, 1793, he accompanied his family to England, where they intended to settle; but the dilapidated state of his father's fortune rendered their stay in London one of privations to which they had not been accustomed, and after a year's residence in different parts of England, they returned to Geneva. They next removed to Châtolaine, and in 1795 to Florence, where they purchased a small farm at Valchiusa, near Pescia. Here Sismondi divided his time between the active superintendence of his farm and literary researches, especially the preparation of his "History of the Italian Republics."

In 1801 appeared at Geneva his first published work, "Tableau de l'Agriculture Toscane." The year previous to its publication he and his parents had again returned to Geneva. He published, in 1803, his essay "De la Richesse Commerciale, ou Principes d'Economie Politique appliquée à la Législation du Commerce." This work he afterwards entirely remodelled, and in 1819 produced under the title of "Nouveaux Principes d'Economie Politique." The views of Adam Smith are almost implicitly followed in the first, but not in the second treatise. At the suggestion of his mother, he was induced, in 1805, to accompany Madame De Staël in a tour through Italy. The first two volumes of his "Républiques Italiennes" were published at Zürich, 1807, and the last of the sixteen volumes which compose that work appeared in 1818. While engaged in writing this valuable history, one of the greatest works of modern times, he was likewise employed as a contributor to the "Biographie Universelle," which was publishing in Paris under the editorship of Michaud. In 1811 he delivered at Geneva a course of lectures upon the "Literature of the South of Europe," which was printed at Paris in 1813, when Sismondi visited that city during the Hundred Days. Political events brought him face to face with Napoleon—an interview which is often referred to.

In 1819 Sismondi began his longest work, "L'Histoire des Français," which occupied him till the close of his life. In 1830 he published, in "Lardner's Cabinet Cyclopædia," an abridgment in English of his "Républiques Italiennes;" and a French edition of this work appeared in Paris in 1832, under the title "Histoire de la Renaissance de la Liberté en Italie." The last of his historical works is entitled "Histoire de la Chute de l'Empire Romain et du Déclin de la Civilisation." This work, which was published at Paris in 1835, embraces the history of 750 years, from 250 to 1000. The other writings of Sismondi are—"Julio Severe," a historical novel (Paris, 1822); "Etudes sur les Sciences Sociales" (Paris, 1836); "De la Vie et des Ecrits de Th. Mallet" (1807), 8vo. He died 25th June, 1842, as he was occupied in correcting the proofs of his "Histoire des Français." He was a diligent worker, averaging eight hours at the desk daily for twenty years of his life; his character was full of benevolence, and he was open-minded and conscientious in his work to the last degree. He was married in 1819 to Miss Allen, an English lady whom he had met in Italy.

SISSOO. See DALBERGIA.

SISTINE CHAPEL (*Capella Sistina*). This famous building forms part of the Vatican at Rome, and derives its name from the Pope who built it, Sixtus IV.; the architect being Baccio Pintelli. The work was completed in 1474. The dimensions of the Sistine Chapel are 133 feet by 45. It is lit by six windows high up on each side.

Raffaëlle's tapestries, the chief cartoons for which form the glory of our South Kensington Gallery, were designed for the hangings of the lower parts of the walls beneath the windows. These tapestries are now replaced by other decorations, and are themselves preserved in a special gallery, the *Arazzi* (this is merely our word *arras*) of the great museum of the Vatican. Above the tapestry ran all around the walls frescos of the greatest contemporary Florentine masters, Botticelli, Perugino, Signorelli, Rosselli, and Ghirlandajo, the first-named being the director of the whole. The frescos answer each other, those on the left wall being subjects from the Old Testament, and those on the right wall from the New Testament. The following are the subjects of these famous pictures: Left wall—(1) Journey of Moses and Zipporah (Perugino); (2) Moses' Miracles (Botticelli); (3) Drowning of Pharaoh (Rosselli); (4) Moses and the Golden Calf (Rosselli); (5) Fall of Korah (Botticelli); (6) Death of Moses (Signorelli). Right wall—(1) Baptism of Christ (Perugino); (2) The Temptation (Botticelli); (3) Calling of Peter and Andrew (Ghirlandajo); (4) Sermon on the Mount (Rosselli); (5) Investiture of Peter (Perugino); (6) Last Supper (Rosselli). Above these fine frescos of the early or pre-Raffaëllite masters range a company of popes, by Botticelli, and then begins the superb ceiling which, fine as are the works above named, completely eclipses them, so that they are unfairly neglected by large numbers of those who visit the renowned chapel.

In 1507 Julius II., the nephew of Sixtus IV., occupied the papal see, and determined to use his power to carry out the work begun by Sixtus IV. in memory of his uncle. He had shrunk from occupying the rooms of the Borgias, and had moved to new apartment, which were being decorated by Raffaëlle, and are known to us as the marvellous *Stanze* and *Loggie* (rooms and external corridors). At the same time Bramante the architect was consulted as to some one fit to paint the ceiling of the Sistine in fresco. He recommended Michelangelo, already greatly renowned as a sculptor. But Michelangelo, then thirty-four, and so ignorant of fresco that he had to take lessons in the rudiments of that art, distrusted his own powers; and with the modesty of genius desired that the work should be given to Raffaëlle, nearly ten years younger, and presumably better fitted for so vast a work, as well as being a skilled painter in the particular style desired. The imperious pope only grew angry at the suggestion, and Michelangelo set to work. It may be fairly said that that glorious All Saints' Day in 1511, when the delighted pope took his visitors to see the first set of stanze and the partially complete Sistine, marks the high-water level of the Renaissance.

The rapidity of Michelangelo's work was marvellous, but the skill with which he has mastered the most difficult problem ever successfully attacked in decoration is still more marvellous. The Sistine roof is a mere flat barrel-vault, deeply cut into by the awkwardly shaped round-headed windows, a structure devoid of beauty or possibility of effect. Michelangelo has painted what the architect should have built; and the astonished spectator sees, as he looks up, a rich architectural design, with bronze and marble pillars, arches and cornices, in splendid profusion. So consummate was Michelangelo's knowledge of perspective that it is exceedingly difficult to unravel the true from the painted mouldings. Among this magnificent architecture, as it seems to be, are placed, with a mixture of the pagan and the Christian sentiments which Dante would have approved, detached figures of the prophets and sibyls who foretold the advent of Christ, then actual place being the triangular spaces between the piercings of the vault for the windows. These are all seated figures, and are about 8 feet high. They are universally admitted to be the grandest conceptions of the painter's art. The

prophet Isaiah is probably the finest of all; the prophet Jonah the most wonderful. Here the painter has skillfully reversed the actual fact, for while the curve of the ceiling is of course inwards, towards the spectator, the figure of the prophet painted upon that curve appears to lean violently back, in bold foreshortening. One of the Sibyls (she of Delphi) illustrates the article *FRASCO* in this work. The flat central part of the ceiling is divided into nine compartments, each containing a scene from the beginning of the Old Testament. Here the Father (a grandly majestic, venerable, bearded figure) separates with his hands light from darkness: creates sun and moon, and the planets; commands the fishes to people the waters. Then follow the Creation of Adam, probably the finest of the series; the Creation of Eve; and the superb picture of the Fall. There are also Abel and Cain, a wonderful stormy Deluge, and the Drunkenness of Noah. The whole is Michelangelo's greatest work in painting. It took him from 1507 to 1512.

Leo X. who succeeded Julius II., continued the work, and commissioned the Raffaele cartoons for the Arazzi; and Clement VII. his nephew (next pope but one) called upon Michelangelo, now an old man of sixty, to complete the Sistine in 1533 by adding two vast frescoes, one at each end respectively representing the "Last Judgment" and the "Fall of Satan." Michelangelo completed the first in eight years, the second remains to be done. The "Last Judgment" is certainly a wonderful work, purposely crowded with every difficulty of the art, but though it fascinates us, we do not love it. It is badly lit, a later pope (Paul IV.) barbarously caused Volterra to paint diaphanous round the nude figures (turning the lines of the picture, of course) and later popes still have put a tawdry glittering altar in front of Christ and the Styx, one of the most parts of the picture. But it must not be forgotten that Clement, in order to clear the way for the vast picture, destroyed some frescoes of the great Florentines of the previous century. Clement's successor, Paul III., took such pride and interest in the work that he frequently attended the artist with his whole court of cardinals, to encourage him. Biagio di Cosensu remonstrated on one of these occasions as to the nudity of the figures, and found himself painted in hell with ass's ears, and the serpent of luxury coiled round him, on his next visit. He indignantly appealed to the Pope, who expressed his regret that he had not been placed in purgatory, whence the intercessory prayers of the faithful might in time have rescued him, but, said he, "the church is powerless over the damned, they suffer in hell for ever." Certainly Biagio is there to this day.

The condition of the Sistine Chapel is disgraceful. Large cracks in the ceiling, and even the rain has been allowed to damage the masterpieces here and there through the imperfection of the roof. Rough "cleanings" have irretrievably damaged the finest surface tints. Up till our own time all the secret papers of each pontificate were burnt at the death of each pope in a great bonfire made in this precious chamber, filling it with smoke; and the daily candles and noise even now keep up a perpetual increase of dirt. It seems almost as if only a perverse madness could permit such shocking disregard of the sanctities of art.

SISTINE CHOIR. This is a very ancient body, specially attached to the person of the Pope, and therefore also to the Sistine Chapel, his private chapel. It consists of thirty-two voices-choral. It professes to trace its origin from that famous music-school of St. Sylvester, pope from 314 to 335, who founded the first organized musical body for the services of the church. The number of distinguished musicians who have belonged to this famous body is remarkable. The great Netherland school, the beginning of modern music, sent it Dufay in 1377, and many other Netherlanders followed him. In the next gene-

ration we find Josquin des Prés at the head of the choir; and in the next Festa, Carpentrasso, Arcadelt, &c. Palestrina himself, greatest of all composers in the ancient style, was a chorister in 1555, till Paul IV. dismissed him because he was married, contrary to the regulations of the choir. Pius IV. got over the difficulty by appointing him composer to the choir. Anerio was his only successor in that office. Other famous Sistine choirmasters are Nanini (1577), Luca Marenzio (1594), Vittoria (1599), Allegri (1629), Bai (1714), and Bainsi (1795).

The performances of the Sistine Choir are almost wholly traditional, and were long believed to be entirely so, one voice following the other without any set rule beyond long established custom. But Mendelssohn saw the shadow of Bainsi's long arm beating time, and several other observers have made it certain that the usual musical methods are observed. Nevertheless, the intense sympathy which grows up by constant singing, all of it unaccompanied, and all in a peculiar and traditional style, gives to the performance of the Sistine Choir an almost unequalled effect, especially amidst the magnificent surroundings of the world's greatest painters.

Since the entry of the Italian troops into Rome on 8th September, 1870, the Sistine Choir has only sung publicly once a year, on the anniversary of the Pope's consecration. Occasionally also at certain papal ceremonies it officiates in the Sistine as of yore, but these ceremonies are kept strictly private. It is in such ways that the latest popes protest against the occupation of Rome as the capital of Italy, and make manifest the imprisonment to which they choose to consider themselves condemned.

SISTOVA, a town of Bulgaria, beautifully situated on the right bank of the Danube, 35 miles south-west of Rustchuk, opposite Simnitsa, with a strong castle, nineteen mosques, and five churches and schools. It has an active trade, and manufactures of wire, leather work, and cotton cloth. Population, about 12,000.

Sistova is the spot where part of the Russian army crossed the Danube in 1877, and here in 1791 a treaty of peace was signed between Austria and Turkey.

SISTRUM (Gr. *seistron*, from *seiein*, to shake), a frame of bronze into which several bars were loosely suspended so as to clash and jingle when moved, which the priests of Isis used to shake with their hands at the performance of the Isiac rites. In ancient frescoes, the goddess is sometimes represented holding a sistrum. The bars were often made by the Egyptians in the form of snakes, with goose-heads, and to increase the noise metal rings were often strung upon the bars. The frame was fixed in a handle, frequently carved in the form of a cat's head, the cat being sacred to Isis. The size of the Egyptian sistra is from 9 to 18 inches long. The *manaueim* of 2 Samuel vi. 5, rendered by "cymbals" in the Authorized Version of the Bible, was really a Hebrew sistrum. The sistrum was introduced into Rome with the worship of Isis, and was a favourite instrument with women at the orgies of the Roman rites.

SISYPHOS (Lat. *Sisyphus*) is one of the most familiar figures in the ancient Greek mythology. He was the son of Aiolos (Lat. *Aeolus*) the wind-god, and married Meropé, a daughter of the Titan Atlas. By Antikleia, wife of Laertes, he was the father of Odysseus, as some poets feign.

Sisyphos was founder and first king of Corinth, and his extreme cleverness, degenerating frequently into cunning, enabled him to invent much that was useful in the infancy of the world, and to get the greatest possible advantage out of his talents. He is the type of the unscrupulous clever man. Eventually he tried to cheat the gods, and met with his deserts. He told the river-god Asopos, whose wife had been carried off by Zeus, whither she had gone; obtaining as the price of his information the famous

spring Peirônê for the Acro-corinth, the hitherto waterless citadel of the new city. Zeus, furious at being caught, sent Thanatos (Death) to punish the king. Sisyphos, however, overcame the daemon, bound him, and made all men thereby immortal—or would have done so if the god Aiês had not promptly come and released “man’s latest friend, the gentle Death.” His first victim was of course Sisyphos. Even now the wily prince did not despair. He induced his wife to leave his corpse unburied at death, so that he wandered on the shores of Styx unable to pass over into Hades. There he was found by Ploutôn (Pluto), who at his prayer permitted him to revisit earth that he might upbraid his wife. Once in the upper air, and inhabiting his resuscitated body, Sisyphos declined to return. Heriês was sent after him to bring him instantly before the angry Ploutôn; and the great god decreed that for a punishment he should perpetually roll a huge block of marble up a hill, which always slipped when near the top, so that Sisyphos had perpetually to begin the fruitless labour over again.

SISYMBRIUM is a genus of plants belonging to the order CRUCIFERÆ. *Sisymbrium allaria* (garlic mustard or sauce-alone) is a weed, growing to a height of 2 or 3 feet, with large heart-shaped leaves, white flowers, and erect pods. It is a native of Britain and Europe, growing under hedges and in ditches. It has a strong smell and a taste not unlike garlic, for which it is frequently used as a substitute, whence it has obtained its Latin name *Alliaria*, from *allium*, garlic. It is very generally used by the poor people of the countries in which it grows as a condiment, with bread and butter, salted meats, or in salads. Linneus says that sheep and cows and poultry eat it, but that horses and goats refuse it. When eaten by cows it gives a disagreeable flavour to the milk. Poultry also which eat it have a bad flavour when cooked. The seeds, when powdered, produce sneezing, and have been employed as a sternutatory. *Sisymbrium officinale* (common hedge-mustard), with small, pale, yellow flowers, is a native of Europe, and grows in waste places and waysides, among rubbish, and along the sides of walls. It is plentiful in Britain, and also occurs in the north of Africa. The whole plant is warm and acid, and is often cultivated for use as a pot-herb. *Sisymbrium irio* (London rocket or broad-leaved hedge-mustard) is a native of waste places throughout Europe, but especially about London. It is said to have entirely covered the ground in the spring following the great fire of London (1666). *Sisymbrium sophia* (five-leaved hedge-mustard or flixweed) grows on dry banks, waste ground, dunghills, and among rubbish.

SISYPHUS. See **SISYPHOS**.

SITAR, a musical instrument of the Persians and Hindus, possibly the origin of the *zither*, which it resembles as closely in fundamental characteristics as in the sound of its name. The Persian sitar has three strings only (*si*, three, *tar*, string), as its name implies. The Hindu instrument has usually five, and these are of wire. It is ordinarily made of a gourd fitted with a cocoa-wood neck, &c., the neck carrying frets. Since the Hindu scales are numerous, the frets are movable, that the performer may adjust them in any series of intervals desired. The sitar is played with a plectrum of twisted wire ending in a ring, which is placed on the forefinger; the left hand “stops” the strings.

SITARIS. See **MELOIDÆ**.

SIT'KHA, SITKA, or BARANOV, the largest island of the George III. Archipelago, situated on the coast of Alaska, in the United States. Its more correct name is New Archangel. The harbour, now known as the Bay of Sitkha, is spacious and safe, and offers excellent anchorage. It was formerly the centre of the administration of the Russian territories in America. At the settlement of Sitkha there are a magnetic observatory, hospital, and

arsenal, but the other houses of the place are little better than wooden hovels, huddled together without order or design. Shortly after its purchase by the United States, steam communication was established with San Francisco.

SI'UM. See **SKIRREL**.

SI'VA. See **INDIA**.

SIVAS, a town in Asia Minor, on the north bank of the river Kizil-Irmak, 420 miles south-east of Constantinople. The valley of the Kizil-Irmak, the ancient *Halys*, here spreads out into a broad and fertile plain. The situation being level, with the exception of only one small circular elevation, the whole town is seen to much advantage when approached from the north. It is interspersed with trees and gardens. The houses are well built, partly tiled, and partly flat-roofed. There are numerous mosques, and the bazaars are extensive and well-stocked with goods, including many of British manufacture. The town also has a considerable transit trade, and some coarse woollens and other fabrics are manufactured. The population is about 25,000. The place was once called Cabura, a name that was changed to Diopolis by Pompey, and subsequently to Sebaste, of which Sivas is a corruption.

SI'WALIK FORMATION, a series of sandstones, hard clays, and occasional conglomerates, of fresh-water origin, extensively developed in the Siwalik Hills to the south of the Himalayas in India. These rocks yield numerous fossil remains of the vertebrate animals inhabiting the Indian region at the period of their deposition, which is now considered to have been the Pliocene age, and they are thus of extraordinary interest to the paleontologist and zoologist. They were first brought prominently into notice about fifty years ago, by the researches of Dr. Hugh Falconer and Colonel S. P. J. T. Cantley, who commenced, but never completed, a great monograph upon the fossil bones, under the title of “Fauna Antiqua Siwalensis,” but the beds and their fossils have been most completely elucidated by the recent publications of the government geological survey. Among the larger fossil quadrupeds the number of species of elephants is particularly noteworthy, some of these being primitive forms, probably ancestral to the surviving species of the present day. There is also a huge extinct mammant, the *Scæotherium*, possessing two pairs of remarkable horns; and rhinoceroses and hippopotami are abundantly represented. Horses, giraffes, camels, oxen, antelopes, and deer have likewise left numerous remains; and there are occasional traces of apes and monkeys. Among carnivorous animals there are several species of hyæna, a dog, a bear, some small cats and viverras, and the great extinct sabre-toothed tiger, *Machærodus*, which has also been found in comparatively recent deposits in Europe and South America. Pigs are represented by about six species, and associated with these are remains of some pig-like animals (*Hyopotamus* and *Anthrocotherium*), which are only found in much older formations in Europe. The most notable of the reptiles is an enormous tortoise, known as *Colossochelys atlas*, supposed by some to have survived until the appearance of early tribes of men, and to have given rise to some prevalent Hindu legends. The shell of this animal, of which there is a restoration in the British Museum, attained a length of more than 8 feet. The other chelonian reptiles are scarcely distinguishable from their living Indian allies, and so likewise are some of the crocodiles and gharials; but the latter were represented in the Siwalik period by many more species than occur in the same district at the present day, and one form has been discovered with remarkable resemblances to the American alligators.

SIX ACTS, the name popularly given to an extraordinary series of six repressive statutes aimed, in 1819, against the political agitation which had continued ever since the French Revolution. They prohibited seditious speaking, writing, &c.; and one of them forbade any

meeting of more than fifty persons without six days' notice to a magistrate, to be signed by seven householders.

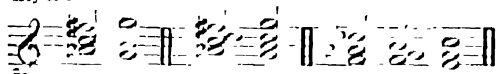
SIX ARTICLES, STATUTE OF, also called the *Bloody Statute* and the *Whip with Six Strings*, an Act of Parliament passed in the reign of Henry VIII. (1539), for the purpose of securing uniformity of belief in regard to the Articles referred to. The Six Articles were—Transubstantiation, Communion in one kind, the Celibacy of the Clergy, Private Masses, Vows of Chastity, and Auricular Confession. Whoever denied the first of these articles was to be burned; those who denied the others were, for the first offence, to lose their property, and for the second to suffer death as felons. The Act remained on the statute-book of the realm till 1547.

SIXTH, in music. See *INTERVAL*.

SIXTH, CHORDS OF THE (and *Chords of the Sixth and Fourth*) See *COMMON CHORDS*, *ADDED SIXTH*, and *AUGMENTED SIXTH*.

The following chords, each of which is followed in the illustration by the chord most usually succeeding, have often received the special names here given; but the modern tendency is to describe them by a more precise and accurate nomenclature.—

Key of C



1. Italian Sixth. 2. French Sixth. 3. Neapolitan Sixth.

Of these, 1 and 2 are forms of the *AUGMENTED SIXTH*, and 3 is the first inversion of the *CHROMATIC CONCORD* on the minor Second of the key.

SIXTUS, the name borne by five popes.

SIXTUS I. (Saint) is generally numbered as the eighth pope. The name has nothing to do with *Sixtus*, either the Roman name or the numeral "sixth"; it is merely a Latinization of Gr. *xyxstos* (or properly *xyxstos*), a porch, and was very appropriate to one who was believed to hold the keys of the gates of heaven. Sixtus, or Xystus, succeeded Alexander I. about the year 119, and died about the year 127.

SIXTUS II. (Saint and Martyr) was born at Athens in 180, and succeeded Stephen I. as pope in 257. He fell amidst the persecution of the Emperor Valerian (258); and St. Cyprian, the famous Bishop of Carthage, so powerful at that time that an appeal on a matter of church discipline was made to him as against the authority of Rome, perished in the same slaughter as that which overtook his opponent.

SIXTUS III. succeeded Celestine I. in 432. His great achievement was the union of the famous Cyril of Alexandria with the powerful John of Antioch, by skilful mediation, and by the overwhelming influence thus obtained, crushing out the Nestorian heresy in the Roman dominions. After the united action of the three great prelates Nestorius himself was driven into exile, and Nestorianism was found only in Syria and in Persia. Sixtus died in 440, and was succeeded by Leo the Great.

SIXTUS IV. (Francesco d'Albergo della Rovere), a Franciscan monk, born near Savona, 22nd July, 1411, succeeded Paul II. in 1471. A fleeting connection with England (then under Edward IV.) occurs in 1476, when Sixtus issued a bull to protect the English clergy against the laity, and another very shortly afterwards to confirm the privileges of the University of Oxford. This pope, in pursuance of schemes of extended sovereignty, supported the conspiracy of the Pazzi against Lorenzo de' Medici (1478). The clergy of Florence assembled in convocation, signed an act of accusation proving Sixtus IV. to have been accessory to the conspiracy, and consequently to the murder of Lorenzo's brother, Giuliano de' Medici. This curious document, in the handwriting of Gentile d'Urbanò, bishop of Arezzo, exists in the archives of Florence. Sixtus induced Ferdinand, king of Naples, to join his troops to

the papal forces and make war upon Florence; but losing this ally, and alarmed at the same time at the progress of the Turks, who had landed at Otranto, he was fain to agree to a reconciliation with the Florentines. Sixtus IV. has the unhappy privilege of being in one sense the founder of the terrible Holy Inquisition, which Fleury, in his "Ecclesiastical History," tells us was "established in the kingdom of Castile by a council under the Archbishop of Seville, and by authority of Pope Sixtus IV.," in 1478. In 1482 Sixtus entered into another intrigue with the Venetians, for the purpose of depriving Duke Ercole of Este of his dominion of Ferrara, which he wished to bestow upon Count Girolamo Riario, one of his nephews. This led to a war, in which the King of Naples and the Florentines supported the Duke of Ferrara against the Pope and the Venetians. The emperor, however, interposed, upon which Sixtus thought it advisable to detach himself from the Venetians (whom he soon afterwards excommunicated *en masse*), and make a separate peace with the Duke of Ferrara. In 1484 the Venetians made peace also, and a few days afterwards Sixtus died (13th August), it is said of chagrin and disappointment at the failure of his ambitious schemes. His fierce persecution of the noble Colonna family in Rome, including the judicial murder of some of its members and seizure of their fiefs, was so scandalous, that, had he not died, a council would have been held to examine his conduct. It was Pope Sixtus IV. who built the *Ponte Sisto* and the *Sistine Chapel*, in the Vatican, in 1473-74, and founded afresh the Vatican Library, which had been in great part dispersed under Calixtus III. Sixtus was succeeded by Innocent VIII.

SIXTUS V. (Felice Peretti of Montalto) was one of the most remarkable of all the popes, and his indomitable energy and commanding intellect were invaluable to the church and state of Rome, which at the time of his accession were in apparently hopeless confusion. He was of Slav ancestry, and was born in 1521 at Fermo, in the marsh of Ancona, whither his father's debts had driven him from Montalto. So poor were the Peretti that Felice had to keep swine and guard the orchard as a boy. He taught himself to read from books he borrowed from school-boys who passed through the field when he was at work, for he had not money enough to pay the smallest school fee. At last a relative took pity on him so far as to pay the school pence, and by living on bread and water alone, and working under the street lamps by night, Felice managed to exist and to get learning enough to become a Franciscan when twelve years old. His progress was now rapid. He became professor of canon law at Rimini in 1544, and he distinguished himself so much at a public disputation in 1549 that he attracted the notice of Cardinal Pio of Carpi, and was by his influence appointed Lent preacher at one of the great Roman churches in 1552. He had a great success, but was anonymously attacked as to the soundness of his doctrines. He sent the paper to the Inquisition, and presented himself for a searching investigation. The Grand Inquisitor Ghislieri was so much impressed by the complete orthodoxy of the friar, that he became his second patron, and Fra Felice was soon renowned as the chief ornament of the severe party in the church, and as a friend of St. Ignatius Loyola, founder of the Jesuits, and of St. Filippo Neri, inventor of the oratorio. Driven from Venice by the Franciscans for his severity, he was appointed consultant to the Inquisition at the Council of Trent, and acted so vigorously in his office that Pius V. named him Vicar-general of the Franciscans, with instructions to reform the order. He not only fulfilled the Pope's expectations in this, but far surpassed them, and was in consequence made Bishop of St. Agatha, and soon after Cardinal Montalto and Bishop of Fermo (1570).

The legend that he now affected to fall into ill-health, tottering along leaning on a stick and coughing at every

step, whilst he concealed the intense force of his character under a most exaggerated humility, in order to gain the tiara, and that when elected, as being so feeble that the contending factions of cardinals thought to use his brief pontificate to gain strength for a quickly renewed contest, he threw away his crutch and faced the astonished cardinals in all his vigour—though repeated in history, narrative, and drama, must be rejected after due examination as unhistorical. The true account of the cardinal's career is that he preserved a strict seclusion, caring for his diocese in minutest detail, editing the works of St. Ambrose in a most conscientious manner (1580), &c. It was, in point of fact, his known severity, ability, and self-control, and his vigorous health, which determined his election, because, as the authentic narratives expressly inform us, the troublous times needed a strong and able master.

Sixtus V. succeeded Gregory XIII. in 1585, and reigned till 1590, when he was succeeded by Urban VII. His first act was to exterminate the banditti infesting the neighbourhood of Rome. Every offender caught was ruthlessly executed with a vigour amounting to cruelty, and a deep terror fell on all men. In not more than a year order began to prevail in the country. Much trouble was caused in Rome by the PASQUINADES or public lampoons: in the article of that name the savage treatment they met with at the Pope's hands is described. The treasury was not only bankrupt, but the revenues were pawned for more than six months in advance; Sixtus amassed treasure, with something like regularity, at the rate of a million scudi in gold per annum. He laid up four and a half million scudi in St. Angelo to be touched only for purposes of a crusade or to avert danger from the church. As the whole revenue of the church was not more than 200,000 a year, this seems surprising, even though the Pope cut down everything, and himself lived upon six pauls a day, worth three shillings of our present money, and in such ways raised the revenue to 350,000 scudi. The rest he gained by enormous sales of offices, by large customs duties, and heavy taxes on ordinary articles, fuel, wine, horses, &c., on licenses to trade, and the like. The possession of this treasure raised the see of Rome enormously in the eyes of neighbouring princes, themselves all at their wits' end for money; for the time, Rome by the power of the purse stood at the head of Italy, save only Naples and Venice. The Pope regarded himself as specially sent to organize the affairs of the church, and indeed most of his work still remains. The cardinals were divided into seven congregations (or as we should call them, committees); Sixtus added eight more, each covering its special administrative purpose. He presided over all, and in fact governed all, rarely consulting any one; his government, excellent as it was, was pure despotism thinly veiled by constitutional forms.

He grew proud of his success; raised his birthplace Ferme, to an archbishopric, and Montalto, the cradle of his race (in Italy), to a bishopric. Loretto (also in Ancona) had the *Santa Casa* miraculously transported thither in 1295. Sixtus determined to raise the casket of such a treasure to the rank of a fortified city: and this was done, though valleys had to be filled up and hills levelled. He then determined that Montalto should possess the tomb, as Loretto the birthplace of the Redeemer; and was shortly before his death preparing a crusading expedition to the Holy Land, with a view to cutting out the traditional sepulchre by a skilful work of engineering, and bringing it bodily to Italy. Seeing in how many things he succeeded, it is difficult not to think but that this, too, would have been accomplished. It was Sixtus who drained the swamps of Orvieto, and the Pontine Marshes of Rome. The *Fiume Sisto* was the great drainage canal of the latter for two centuries, till Pius VI. took up the work in 1777. It was he who began the Italian glass manufacture, and who be-

gan the woollen industries; it was he who imported silkworms and forced every commune in the States of the Church to plant mulberry-trees, under heavy fines, for their support. By bringing the Aqua Marcia to Rome from a distance of 22 miles, and pouring it out by 20,537 cubic metres a day, upon the Quirinal in the famous "Aqua Felice," called by his baptismal name, and by making good roads and steps, as in the Piazza di Spagna, Sixtus enabled Rome once more to climb those hills from which for some centuries she had been driven: the poets of the day boasted that in only one or two years Rome was doubling her shrunken extent. The great obelisk of the circus of Caligula, the only one standing in Rome, was taken down by Sixtus V. in 1586 and re-erected in the square of St. Peter's, where it now stands, a work "the most difficult conceivable by the mind of man," as the Pope himself has recorded. He consecrated the great monolith by surmounting it with a cross, containing a piece of the true cross. The broken obelisk of the Lateran, the largest in the world, he repaired and re-erected in front of the great palace which he had built there, on the site of ancient papal buildings. The dome of St. Peter's was yet undone. This was a great eyesore to the energetic pope. The architect Fontana (hero of the obelisk) was prepared to finish it in ten years. Sixtus provided the necessary funds, engaged six hundred men, who worked incessantly by day and night shifts, and had it all done in twenty-two months. The lead covering was about to be put on when he died. On the other hand, no antiquarian but is angry at his destruction of the famed Septizonium and other parts of the palaces of the Cæsars, extant in a practically perfect condition in his time, or at his desecration of the splendid columns of Antoninus and of Trajan, by dedicating them to St. Peter and St. Paul respectively, and replacing five imperial bronze statues by very inferior figures meant for the apostles. The antique statues of the goddesses he permitted to remain by placing crosses in their hands, &c., but the Laocœon and the Apollo Belvedere he several times desired to destroy as anti-Christian, and was with difficulty prevented.

Sixtus V. carried into external relations the same impetuosity with which he remodelled Italy. He excommunicated Henry IV. of France and our own Queen "Bess," and laid England under an interdict (1586), and was preparing the mighty Eastern Expedition above referred to when death overtook him, 27th August, 1590. As he breathed his last, a fearful storm burst on the Quirinal. The people, chafing under five years' restraint from lawlessness, and groaning under taxes levied while the Castle of St. Angelo was already full of treasure, had persuaded themselves that the power of this benignant tyrant was supernatural; and now thought that the fiend, to whom he had sold himself, had come in the whirlwind to carry him off at the appointed time. They rushed along the streets breaking all the statues to Sixtus that only a year or two before they had gratefully put up, and slandered his memory by hints of unorthodox opinions. Finally, to mark their repentance of their allegiance, they passed a decree that henceforward no statue should be erected to a pope in his lifetime.

SIZAR, a term used in the Universities of Cambridge and Dublin, for a class of students who are admitted on easier terms as to pecuniary matters than others. These pecuniary advantages arise from various sources in the several colleges, and are of different value. Originally certain duties were required of the students so admitted approaching to the character of menial, but these have been long discontinued. A similar class of students at Oxford are called *Servitors*. The word is derived from *size*, the university term for an allowance of provisions at the college buttery; and that from the verb to *assize*, simply another form of *assess*.

SIZE. A sort of thin varnish or glue, used by painters, paper manufacturers, and in many other trades. It is usually made of the shreds and parings of leather, parchment, or vellum, boiled in water and purified. It is also made from common glue and from potatoes.

SKALLD. See SCALD.

SKATE is the common name of several species of RAYS belonging to the family *Rajidae*. The Common Skate (*Raja batia*) is abundant on British coasts, being taken as far north as the Orkneys; it is also caught in the German Ocean and the Mediterranean. The body is in the form of a broad rhombic disc, formed by the pectoral fins extending to the snout; the skin is more or less covered with short spines. The tail is spineless, distinct from the disc, and bears two small dorsal fins. Each ventral fin is divided into two by a deep notch. The skate is of a dusky gray or lead colour, whence it is called in Scotland the Gray or Blue Skate. In parts of the south coast of England it is known as the Tinker. It attains a great size, reaching sometimes a weight of 200 lbs. A specimen in the British Museum is $5\frac{1}{2}$ feet broad and $6\frac{1}{2}$ long. The eggs are deposited in pairs, in horny cases or "purses," in the latter part of the spring or summer. The skate is more esteemed for food on the Continent than in England. It is much used by English fishermen for bait for lobsters and crabs. The Long-nosed Skate (*Raja romer*) is remarkable for its long sharp snout. It is common on the shores of Northern Europe, and is also taken on British coasts. It attains a large size. The body is smooth and of a lead colour. The Butter Skate (*Raja erinacea*) is thicker and heavier than the common skate, and frequently attains a length of 8 feet. The body is gray above and white below, whence it is known in Scotland as the White Skate. The margins of the body are deeply undulated. It is taken on the coasts of Europe and Britain, and is esteemed for food, especially in France. The Shagreen Skate (*Raja fullonica*), which has the body above and below covered with minute spines, is taken on our northern coasts. It is a comparatively small species, being about 2 feet 8 inches long.

SKELTON (Greek, *skelatos*) is the name applied to those harder parts of organized bodies which form the framework upon which the softer tissues are fixed. It is more particularly applied to the collection of bones which in an animal either serve as fixed points for the attachment of the soft parts, or form cavities for inclosing and protecting important organs, or constitute the apparatus of support and the passive instruments of voluntary motion.

Animals of the lowest organization, or Protozoa, consist either of a homogeneous mass, as Amoeba, or of this mass associated with a skeleton, as in Sponges, consisting of a firm tissue and embedded silicious or calcareous spicules. In others, again, as in Foraminifera, the external skeleton occurs in the form of a cage, and consists of pure silex. In Zoophytes (Columbata) the calcareous skeleton is either external or internal. In the Echinodermis it is also external as regards the viscera, but covered by an organized skin. It is composed of a great number of pieces arranged into more or less beautiful forms. In insects the skeleton is partly internal, but chiefly external, and its hardening material is a particular kind of principle, called *chitine*. The same is the case in the crustaceans, when, however, it is rendered denser and more brittle by combination with the carbonate and phosphate of lime. In the Mollusca it is occasionally internal, but more commonly external, constituting the shell, and being rendered hard by the carbonate of lime. Some of the Cephalopods possess not only a shell or external skeleton, but also a rudimentary internal skeleton in a cartilaginous form. Ascending still higher in the scale of creation we find it fully developed in the Vertebrata, which invariably possess an internal skeleton, forming the support and fulcrum of the locomotive members, and the defence of the nervous

centre. Except in a few fishes, where it is cartilaginous, the vertebrate skeleton is always osseous, or consolidated by a considerable admixture of phosphate, with various hardening salts. This is distinguished as the *endo-skeleton*. When the protecting case is formed of osseous plates adhering to the skin, as in the crocodile, the armadillo, and in many fishes, it is called the *exo-skeleton*.

On the examination of skeletons many of the most important facts of comparative anatomy depend; for the bones, being the least destructible of the tissues, are the most convenient organs to examine in the different classes of the higher animals; and in accordance with the rule of the exact adaptation of all the parts of an organized body to each other, the skeleton of each animal affords general indications of the characters of every other organ in its body. And not only so; but each bone, according to the same rule, affords indications of the characters of the rest of the skeleton, and therefore, though less certainly, of the other organs of the body. Hence it is that, by an examination of a part of the skeleton of an extinct animal, geologists are enabled to form very probable suppositions of the form of the whole; knowing by certain marks on the bones that they served for the attachment of muscles of corresponding form and strength, and that these muscles were adapted for peculiar movements, which again were most probably employed for certain purposes closely connected with the mode of life and the whole adapted organization of the animal.

The human skeleton is divided into three principal parts: the trunk, the head, and the extremities. Neither the whole number of bones composing it, nor that in each main division, can be exactly stated, for many which are in early life separated, are subsequently united; but as an approximation, the following enumeration may be adopted:—Cranium, 8; face, 14; internal ears, 8; vertebral column, 24; chest, 26; pelvis, 11; upper extremities, 68; lower extremities, 64; in the whole, 223.

The trunk is composed of the spine or vertebral column; the chest, including the ribs and sternum or breastbone; and the pelvis, the circle of bones on which the spine rests. The spine is the column of bones which, in the erect posture, supports the head on its summit, and rests with its base upon the sacrum. It consists of twenty-four bones, called vertebrae (from Lat. *verto*, I turn), because it is their motion upon each other which enables the trunk to be turned round, and is fully described and illustrated in the article BACKBONE. The same article contains an account of the comparative anatomy of the vertebral column in other animals than man; and includes with the backbone the allied structures of the ribs and pelvis.

The spine in all vertebrated animals serves several offices in the economy. One is that of guarding the spinal marrow, which, with the roots of its nerves, is inclosed in the long canal formed by the superposed rings of the several vertebrae. It is also the main support of all the rest of the skeleton. The head, the ribs, and the pelvis directly articulate with it; and through the medium of the pelvis and sternum it suspends both the lower and upper extremities. It is the passive instrument of all the motions of the trunk, and the centre about which each of the limbs as a whole is moved. For these purposes it is adapted by combining firmness with flexibility and lightness. The limbs and extremities themselves are described in the articles ARM, HAND, LEG, FOOT; and the SKULL has also a separate article devoted to it, as has also the NOSE. It is convenient here to give views of the human skeleton as a whole, in order to connect the parts elsewhere studied in detail. The Plate accompanying this article shows all the chief bones of the body and gives their anatomical names.

SKELTON SHRIMP. See EDRIOPHTHALMA.

SKELTON, JOHN, was born about the year 1460. Very few particulars of his life are known. He is first

mentioned in the preface to Caxton's translation of the *Æneid*, printed in 1490, where he is said to have been lately created poet-laureate in the "Unyversite of Oxenforde." About twelve years later he received the same honour from Cambridge. He was ordained deacon in 1498, by the Bishop of London, and priest the following year, and at this time he was tutor to Prince Henry, afterwards Henry VIII. In 1507 he was rector of Diss in Norfolk, and curate of Trumpington in Cambridgeshire. In the reign of Henry VIII., if not during the lifetime of his predecessor, he was appointed orator regius, as he styles himself in the title to several of his poems, though whether with any salary does not appear.

Skelton is the one English poet of mark whose name is associated with the reign of Henry VII. He wrote several poems on court events, such as the creation of Arthur as Prince of Wales, and of Henry as Duke of York, &c., as well as a treatise, "The Mirror of a Prince," for his pupil, Prince Henry, Latin odes, &c. He stood high in favour with that learned lady and foundress of colleges, the Lady Margaret (the king's mother), and Erasmus specially congratulated the king on his boy being with Skelton, the "special light and ornament of British literature." At the end of Henry VII.'s reign he produced his first important poem, the "Bowe (Fr. *bouche*, mouth, i.e. provisioning) of Court," a long-winded conventional allegory, not much to modern taste, though relished at that time. But the work of his own fancy, "the Boke of Phyllyp Spauowe" (1508), written at the same time, is still not only readable, but most interesting. The strongly accented, rude, popular verse is of his own devising, and very suitable to the style of thought which, under guise of a maid's lament for her dead sparrow, gives many a pungent satire on the life of the day. The poet's sympathies were with the people, and he used extraordinary boldness in expressing himself, especially when we consider that he was so closely connected with the court.

Skelton long remained in great favour with Henry VIII. after that king's accession, and was also a friend of Wolsey in his earlier days. But when Wolsey aimed at the tiara, and for his continental schemes taxed the people to impoverishment, while the royal state he kept seemed like a wanton insult to troubled men, Skelton denounced him loudly. He lost the favour of the king. It was easy to get him suspended from his rectory, on the charge that he had married the mother of his children, though this was a thing many honourable priests did in that age rather than leave their children illegitimate (as Wolsey, for one, did); but the real grievance was Skelton's broad opinions, which even leaned towards the new teachings of the Reformation. His "Speke Parrot" (about 1522), in Chaucer's seven-lined stanza, is a medley of apt sayings, amidst which sharp touches at the great chancellor abound. Then came his "Why come ye not to Court?" in Skeltonic verse, a powerful, direct attack on Wolsey. "To which Court?" he asks. "The King's Court or Hampton Court (Wolsey's new palace)?" After a picture of Wolsey's extravagant pomp,

"He regardeth lordes No more than potshordes,"

he proceeds thus, contrasting the butcher-origin of the great man with his present state—

"He ruleth all at will, Without reason or skill:
Howbeit the primordial Of his wretched original.
And his base progeny, And his greasy genealogy:
He came of the sang-royal Cast out of a butcher's stall."

It is hardly to be wondered at that 1000 such lines (and a little over), followed by a like set of "Colin Clout," supposed to be the thoughts of a plain countryman upon the evils of the church and the churchman-ruled state, brought Wolsey down upon him with all the vengeance of former friendship turned to hate. Skelton had made a friend of Islip, abbot of Westminster; thither he fled for sanctuary

in his need, and there he died in 1529, only a few months before the fall of his great enemy, to whose wrong-doings the king's eyes were at last opened.

SKERRYVORE LIGHTHOUSE stands on a reef of rocks about 11 miles south-west of the Island of Tiree, and nearly 30 miles from the nearest point of Argyllshire, Scotland. The reef is from 8 to 10 miles in length, and was formerly very dangerous. In such a situation as Skerryvore everything had to be provided and transported from a distance. A pier was built at Mull, where the granite for the tower was quarried, for the shipment and landing of materials; and at Tiree a harbour or basin, with a reservoir and sluices for scouring the entrance, was formed for the accommodation of the small vessel which attends the lighthouse. The operations were commenced in the summer of 1838, by placing on a rock a wooden barrack. The framework was erected in the course of the season, but in a great gale which occurred on the night of the 31st of November following it was entirely destroyed, nothing remaining to point out its site but a few broken and twisted iron stanchions. In the following year a second and successful attempt was made to erect another house of the same description, strengthened by a few additional iron ties, and placed on a part of the rock which it was hoped might possibly be less exposed to the force of the heaviest waves than the site of the first barrack. The foundation stone of the tower was laid on 7th July, 1840. The entire work, executed under the superintendence of Mr. Allan Stevenson, was accomplished without the loss of a single life. Many times cranes and other materials were swept away by the force of the waves, and the attendant vessels driven by sudden gales to seek shelter at a distance. The light was exhibited for the first time in February, 1844. The lighthouse is probably one of the largest and boldest works of the kind in the world, being 138 feet high, 42 feet at the base, and 16 feet in diameter at the top. Its cost was £87,000. The light can be seen at a distance of 18 miles. As an example of the difficulties which had to be overcome in its erection it may be stated that the waves of the Atlantic sweep over the reef with such fury that their pressure is equal to 3 tons per square foot.

SKIEW-BRIDGE, a bridge in which the passages over and under the arch intersect each other obliquely. Where space and neatness do not require to be considered an oblique arch may be avoided, either by building the bridge square with the upper passage, and making the span so wide as to allow the stream to pass under it without being diverted; or by building the arch square with the stream, and of sufficient length to allow the upper passage to take an oblique course over it; but either of these is a clumsy expedient, although well adapted for some situations.

The difficulty of building skew-bridges increases with the obliquity of the angle from 90° to 45°, which is supposed to be the most hazardous angle for a semicircular arch; but beyond that point, instead of increasing it rather diminishes to about 25°, which appears to be about the natural limit for a semi-cylindrical arch. Elliptical oblique arches are deficient in stability, more difficult to execute, and more expensive, than semicircular or segmental arches.

The construction of skew-bridges of iron or timber is comparatively simple; the ribs or girders of which such bridges are composed being of the usual construction, laid parallel with each other, but the end of each being at a distance of that next preceding it.

SKHISMA, a very small interval used in acoustics, measuring the ratio $32768:38205$ with log. 000199, and very nearly equal to 2 cents by Mr. Ellis's notation of 100 cents to the equal semitone. The exact measure of a skhisma in cents is 1.953. A skhisma is the difference between eight Fifths + one major Third (B♭) and five Octaves (C). Eight Fifths up from any C brings us to a G♯, and the major Third from this is B♭.

SKIBBEREEN, a small seaport of Ireland, situated in the county of, and 42 miles south-west of Cork, on the Ilan, which is navigable for vessels of 200 tons burden from Baltimore harbour to within 2 miles of the town. It is a thriving place, with a good retail trade. The chief buildings are—a sessions-house, union workhouse, church, Roman Catholic chapel, and Methodist chapel. Skibbereen is 12 miles south by east from Bantry. The population in 1881 was 3631.

SKID, a shoe or drag used for preventing of a waggon or carriage from revolving when descending a steep hill; also a curving timber to preserve a ship's side from injury by heavy bodies hoisted or lowered against it.

SKID DAW, a mountain of England, in the county of Cumberland, 4 miles north-east of Keswick, with a height of 3058 feet. With Saddleback and some lesser hills it forms a circular isolated group, rising steeply from Bassenthwaite Lake on the west and the low country on the other sides. The rocks are of a peculiar slate, the oldest in the district, pierced towards the base of the mountains, on the inner side, by granite and other plutonic rocks.

SKID DAW SLATES, a series of dark slates in the Lake district of England, containing fossils similar to those of the Arenig and STIPPLE-STONES BELLS of Wales. They can rarely be worked for roofing purposes, owing to their tendency to split up into small flakes.

SKIL LING, the Danish version of our word "skilling," but of far other value, for it is not worth much more than a farthing. The rigsdaler, which is worth nearly 2s. 2½d. English, contains 96 skilling. The single skilling is therefore worth 2½d. to be exact, say a farthing and a ninth of a farthing.

The *Norwegian Skilling* is the twenty-fourth part of the ort, and is worth therefore about ¾d. English, more than half as much again as the Danish coin. Both the coins are being gradually superseded by the coinage of the Scandinavian Monetary Union.

SKIMMER. See SCISSOR-BILL.

SKIN. The skin is the outer covering of the body; and having to serve at once as a defence for the more deeply seated structures, as an organ of touch, and as an apparatus for secretion, it is one of the most compound of all the tissues. It is composed of two chief parts—a vascular basis named *cutis* and a superficial layer named *epidermis* or *cuticle*, which is not vascular.

The *cutis* is made up for the most part of fibres and lamellæ like those of common cellular tissue. The external surface of the skin presents a variety of wrinkles. The larger of these are produced by the action of muscles, which in many parts throw the skin into folds; others

result from the removal of the fat beneath it, and again others, which are seen most plainly on the palms and balls of the fingers, and on the corresponding parts of the foot, run in very close parallel ridges, and indicate the arrangement of subsequent rows of sensitive papillæ, with which the whole surface of the skin is beset, and which in the parts just named, and in some others, are arranged in regular double lines. In their most developed state, on the balls of the fingers for example, the papillæ are very fine conical processes standing somewhat obliquely, and so densely set that their summits form a seemingly smooth surface. On these parts each elevated line which one sees on the surface has beneath it two rows of papillæ; for when looked

wheels

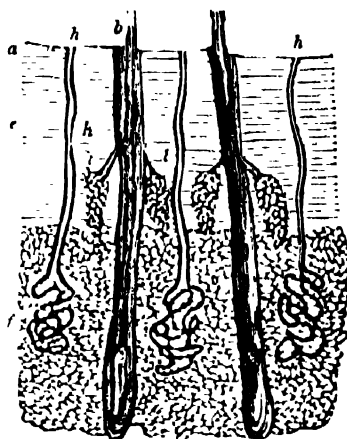


Fig. 1.—Section of skin from head, magnified 14 times.

s, Sebaceous follicles; *c*, hair follicles; *h*, deriferous glands; *f*, subcutaneous cellular and adipose tissue; *e*, the dermis; *a*, the epidermis; *b*, the projecting parts of the hair.



Fig. 2.—Section of the skin of the finger, magnified 14 times.

a, *b*, The epidermis; *c*, colouring matter of pigmentum; *d*, rete mucosum of Malpighi; *e*, the dermis or true skin; *f*, subcutaneous and adipose tissue; *g*, *g'*, sudoriferous glands; *h*, spiral canals going from the surface at *i* and terminating on the surface at *i*.

are the chief instruments by which the sense of touch is exercised.

The chief secretory apparatus of the skin consists of the perspiratory glands, which are disposed over its whole extent, but, like the papillæ, are largest and most numerous in the palms and soles. These glands are composed of spiral tubes, opening on the surface of the epidermis, and as the whole superficies of the body is 14 square feet, it is probable that, as Eichhorn calculated, there are not less than 10,000,000 of these glands scattered through the skin.

It is in them that the perspiration is being constantly formed, though it most generally passes away as fast as it is produced in an invisible vapour, and during health collects in the form of sweat only when it is very rapidly formed, as during active exercise.

Another secretion from the skin is that of the oily sebaceous matter by which its surface is always kept in a slight degree greasy, so that water adheres to it only in drops, and does not easily soak into the substance of the epidermis. This secretion is produced by the sebaceous glands, as well as the hair-follicles, on which they are almost always attendant.

The loss of fluid by these secretions from the skin is in some measure compensated by the absorption which it also exercises. It is uncertain how much, if any, of the vapour of the atmosphere is thus imbibed; but the skin absorbs fluids placed for a short time in contact with it so rapidly, that (especially after long fasting) a perceptible increase of weight is observed when the person has been in a bath. Besides its secretions, materials are produced from the

vessels of the skin of which are formed the cuticle, the hair, and the nails.

The cuticle, or epidermis, is an insensible and non-vascular membrane, laid over the whole external surface of the body in a layer, and composed of several layers of cells: of the two layers into which it may commonly in an ordinary dissection be split, the lower is called *rete mucosum*, or *rete Malpighii*, the upper and outer more particularly *epidermis*. It is composed entirely of cells.

The epidermis is the seat of the characteristic natural colours of the skin, as well as of the colours of freckles and other superficial marks. In dark-complexioned races, especially in negroes, it is very thick, and its cells are filled with minute black or otherwise coloured pigment granules, many of which also lie loose among them. Its thickness renders it less penetrable by the rays of heat; and it is hence (and not on account of its colour, which would have an opposite effect) that a negro can bear the exposure of his skin to a degree of solar heat which blisters that of a European.

Diseases of the skin are very numerous and prevalent, but in the case of the majority which occur they arise from the neglect of some of the conditions necessary for the health of the skin. These conditions, in general, are good nutritious food, which should be properly digested; a due amount of warm clothing, especially during changeable and cold weather; constant and regular exercise, so as to keep the skin, as an excretory organ, in perfect order; and frequent ablution of every part of the body, without which, and the occasional use of soap, it is vain to expect to be free from many forms of skin disease.

SKINK or **SCINK** (Scincidae), a large and widely distributed family of lizards. The Common Skink (*Scincus officinalis*, Plate II., LIZARDS, fig. 6) is a small lizard about 5 or 6 inches long, with a long spindle-shaped body, ending in a conical pointed tail. The limbs are very short, each with five clawed scaly toes. The head is small and wedge-shaped, with a flat muzzle. The upper part of the body is usually yellowish or silvery-gray in colour, marked with darker transverse bands; the under surface is generally silvery-white. The skink is a native of Syria, Egypt, Nubia, Abyssinia, and Arabia, and is also found in Senegal. It runs quickly and with incredible rapidity. When caught it struggles to escape, but never attempts to defend itself with its teeth or claws. It delights to bask in the rays of the sun. It feeds on insects. This lizard is believed to be endowed with surprising medicinal virtues; it was consequently an object of commerce, especially in the sixteenth century. Numbers, as Pliny states, were imported to ancient Rome in a salted state, as Belon says they were in 1551. All belief in the virtues of this lizard is now exploded; it no longer retains a place in the *materia medica*, and even in Egypt and Arabia its reputation is gone. Another species (*Scincus americanus*) inhabits the Southern United States. It is about 13 inches long, with the back and tail olive, the head red, and the under part yellowish. Unlike the Old World species, it bites severely when taken.

Some snake-like lizards are also included in this family, as the BLIND-WORM of Europe (*Anguis fragilis*), which has no external limbs. The species of the genus *Seps*, found in Southern Europe and Northern Africa, possess external limbs, but they are very small ones.

SKIP-JACK. See ELATENIDÆ.

SKIPPER (Hesperiidæ) is a large family of BUTTERFLIES, approaching the moths both in structure and habits. The skippers are mostly small butterflies with thick bodies, large heads, and comparatively small wings. Both sexes possess six pairs of full developed legs, with only one pair of spines. The antennæ are widely apart at the base, and more or less hooked at the tip. The caterpillars are short, with a large head, and live in rolled up leaves, and some-

times spin a cocoon for the chrysalis. The butterflies are generally dull-coloured, and are noticeable for their short, abrupt flight, whence the name skipper is applied to them. The Grizzled Skipper (*Hesperia malar*) is a small British butterfly common in woods. It is blackish-brown with a greenish hue and numerous creamy-white spots. The Large Skipper (*Pamphilia sylvanus*) is very common in Britain, in and near woods, &c. The upper surface of the wings is a rich dark brown, shaded and spotted with tawny, with a black longitudinal patch near the centre of the fore wings in the male; the under surface is greenish, with indistinct yellowish spots. The Pearl Skipper (*Pamphilia comna*), found chiefly in the southern counties of England, closely resembles the preceding, but has the under surface of the wings greenish, with distinct white spots. The Small Skipper (*Pamphilia lineæ*) is another very common British species, with the wings of an orange colour, shaded into brown at the borders. Several other butterflies of this family are British.

SKIPTON, a market-town of England, in the county of, and 44 miles west from York, and 219 from London, on the Midland line, the capital of the hilly region called Craven, is situated between the Wharfe and the Aire, in the centre of a good grazing district. It consists principally of one long and picturesque street, at the head of which are the Perpendicular church, partly restored in 1853, and the old castle, which consists of two portions; the round towers and connecting curtain dating from the time of Edward II., the inhabited portion from that of Henry VIII. It was formerly the seat of the Clifford family. Skipton is famous for its cattle markets, held once a fortnight. It contains an excellent grammar-school, a saline spring, pump-room, and baths, a public hall erected in 1861, and some dissenting chapels. There are some important limestone quarries in the neighbourhood, the stone from which is exported by the Leeds and Liverpool Canal, and there is cotton and worsted spinning, paper-making, and an iron-foundry. The population of the town in 1881 was 9091. In the neighbourhood of Skipton (Sheepstown) are Bolton Abbey, Burden Castle, and Rylstone.

SKIRRET (*Scum asarum*) is a plant belonging to the order UMBELLIFERÆ. The skirret is a native of China, but has been for several centuries cultivated in Europe for its roots, which are tuberos and clustered about the size of the little finger. They are sweet, succulent, and nutritious, with an agreeable aromatic; when boiled and served with butter, they form a pleasant article of food. The skirret is a perennial herb, though it is usually treated as an annual. It is about a foot high, having the lower leaves pinnate, with from five to nine oblong finely toothed leaflets; the leaves at the base are sheathing, and the upper leaves are ternate, with lanceolate leaflets; the small white flowers form an umbel.

SKOBELEV, MICHAEL, a celebrated Russian commander, was the son of a general in the Russian army, and was born in 1813. He is said to have been the great-grandson of a Scobie from the west of Scotland, who emigrated to Russia and rose to distinction in the Russian navy. Born into military life, he was educated at the Military Academy of St. Petersburg, where, though somewhat insubordinate at times, he was an eager and industrious student. He first saw active service in connection with the Russian expedition against Khiva, when he was appointed to the command of a regiment of Cossacks sent from Kindey Bay, on the Caspian, to join the corps under the orders of General Verefkun, which operated from Orenburg. The troops forming the expedition suffered terrible hardships, but ultimately effected the capture of Khiva, the first to enter the city being Skobelev, who, having battered down Hazavat Gate, made his way to the palace of the Khan at the head of 1000 men. He

subsequently gained fresh distinction by exploring, in the dress of a Turcoman, the desert route between Khiva and Igdz, his journey, made through the midst of a savage and infuriated enemy, being acknowledged as the most intrepid feat of the war. In 1875 the outbreak of disturbances in the Khanate of Khokand resulted in the despatch of a Russian expedition into that state, and Skoblev was intrusted with one of the principal commands. It was mainly due to his valour and to the energy with which he followed up the beaten detachments of the enemy that the Khokandians became so speedily disheartened; and at the battle of Makhran, as commander of the cavalry, he directed a movement that resulted in the capture of fifty-eight guns. Later in the campaign, in the course of the retreat from Andijau, he made a daring night attack upon the camp of the enemy, and at the head of a small force of cavalry succeeded in routing the whole army opposed to him. He was ultimately made the first governor of Ferghana, as the new province was called; but, venturing to expose something of the corruption prevailing throughout the public departments, he made powerful enemies, whose machinations compelled him for a time to retire, so that he was under a cloud when the war against Turkey began in 1877. He contrived, however, to get an appointment, without a command, on the staff of the Grand-duke Nicholas; and when the advance guard of the army crossed the Danube, he swam his horse over the river while the rest of the troops crossed in boats. Such a man was not to be denied, and he was soon placed in a position of responsibility suitable to the reputation he had gained. In the second battle at Plevna his skilful impulsion of the cavalry checked the Turkish advance, and virtually saved the Russian army from destruction; and in the subsequent siege of that town, he took a prominent part, becoming without question the hero on the Russian side of that memorable affair. Raised to the rank of lieutenant-general, he made a rapid passage to the Balkans after the fall of Plevna, turning the left flank of the Turks and compelling the retreat which resulted in the peace of San Stefano. After the close of the war he returned to Central Asia, where he put an end to a prolonged and harassing struggle by the capture of the Turcoman stronghold of Geok Tepé. He subsequently became known as a prominent advocate of Pan-Slavism, and some of his public utterances, directed against England and Germany, gave rise to serious apprehensions throughout Europe, and apparently caused some embarrassment to the Russian government. He was, however, too great an idol with the army and the nation to be seriously interfered with, and his influence was rapidly increasing when his career was cut short by his sudden death under somewhat mysterious circumstances, at Moscow, 7th July, 1882.

SKOPAS, a very celebrated Greek architect and sculptor, a native of the island of Paros; practising his art from about 390 to 340 B.C., or about two generations after Phidias. He was the most distinguished of the sculptors employed on the tomb at Halikarnassos, of Mausólos, king of Karia, about 350 B.C. Many interesting remains of this monument (Mausoleum), considered one of the seven wonders of the ancient world, have been lately recovered and deposited in the British Museum; the sculptures of the eastern face are the work of Skopas. Skopas was also the chief sculptor concerned in the reconstruction of the temple of Minerva Alea at Tegea, described as a work of great magnificence by Pausanias, executed about 385 B.C. He is mentioned as a sculptor in bronze as well as marble, but nearly all the works attributed to him by ancient writers were in Pentelic or Parian marble. He has also the credit of being the sculptor of the celebrated group of "Niobe and her Children," now preserved in the gallery of the Uffizi at Florence.

SKU'A (*Stercorarius*) is a genus of sea-birds belonging to the family Laridae, distinguished from the true GULLS (*Larus*) by having a more powerful hooked beak, in which the base of the upper mandible is covered with a cere, and by their large and strongly hooked claws. The skuas are bold and ferocious birds, chiefly natives of the northern latitudes, breeding on wild heaths and solitary islands.

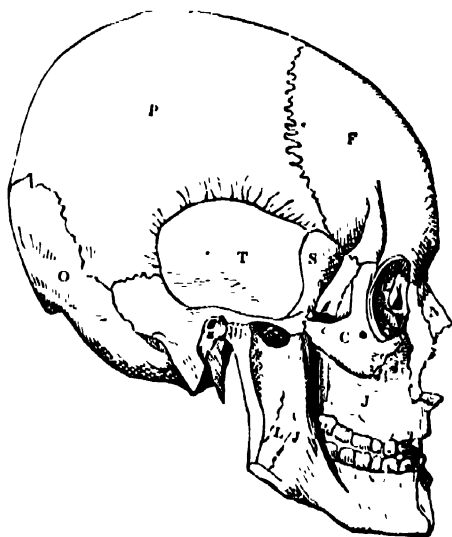
The Common Skua (*Stercorarius catarrhæctes*) is an inhabitant of the arctic seas, visiting the British shores chiefly in the winter, but breeding in some of the Shetland Islands. It is of a dark-brown colour, slightly variegated with reddish-brown; the primaries are marked with dirty white near their base; the two middle tail-feathers are scarcely longer than the rest; and the bill and feet are black. The length of the bird is about 2 feet. The skua is generally seen in pairs. Its flight is exceedingly rapid and powerful, and it avails itself of this advantage to chase the smaller gulls and compel them to give up the fishes which they have just caught, rarely taking the trouble of fishing for itself. It also preys upon its smaller neighbours, and tears its prey to pieces with its bill, securing it the while by means of the crooked claws with which its toes are armed. This bird breeds in the highest moorlands in moss or heather, and lays two olive-brown eggs. It defends its young with great courage, and will even beat off the eagle if he comes too near its place of abode.

The Arctic or Richardson's Skua (*Stercorarius crepidatus*), a much smaller species, is the most numerous of the species which visit Britain, breeding in the Hebrides, Orkneys, and Shetlands; it migrates southward in winter as far as the Cape of Good Hope. The plumage is often of a uniform sooty colour, but sometimes the under parts are light brown. The Pomatorhine Skua (*Stercorarius pomatorhinus*) only occurs as a winter visitor to Britain, breeding in the extreme north of both hemispheres. It is 21 inches in length, dark brown in colour, with the head black, the neck white, and the breast white, more or less striated with brown. The Long-tailed or Buffon's Skua (*Stercorarius parasiticus*) occurs occasionally on our coasts in autumn on its southern migration. It is only about 13 inches long, brownish-gray above, with the neck and breast white and the abdomen light brownish-gray. The middle tail-feathers are greatly elongated. In the Southern Ocean there is a species, *Stercorarius antarcticus*, larger than the common skua, but distinguished by its nearly uniform sooty-brown plumage; it preys chiefly on petrels.

SKULL. The human skull is distinguished from that of all other vertebrates by several important characters. The relatively large size of the cranium or brain-case, the parallelism of the face with the spinal column, the non-projection of the mouth, and the absence of incisive bones, together with the prominences of the chin, are some of the chief points. It is usual to divide the skull into the cranium, or skull proper, and the face.

The *cranium* or brain-case is composed of eight bones, which are mostly of a flattened form, convex externally, and concave internally. The *frontal* bone forms the forehead, and the roofs of the orbits; the *occipital* bone forms the back and under part of the head, and in this bone is the large hole through which the spinal cord passes down from the brain. The two *parietal* bones meet in the middle above, and form the upper and lateral parts of the head; in the centre of each is a protuberance giving the greatest breadth to the head, rather further back than its middle. The *temporal* bones are named from the Latin *tempus*, time, because on the hair covering them the traces of time are first manifested. They are placed one on each side, occupying the inferior lateral parts of the cranium, and extending into its base. In each is seen the funnel-shaped opening which admits the waves of the air to the drum of the ear, called the *external auditory canal*, to the edges of which the external ear is appended. The

hard part of each, extending into the base of the cranium, contains the essential part of the organ of hearing. The two remaining bones are placed at the base of the cranium, and belong equally to it and to the face. The *ethmoid* or sieve-like bone is so named, on account of its upper plate being perforated with forty or fifty holes, through which the twigs of the olfactory nerves pass into the nose. A small part of it forms a portion of the inner boundary of the orbit, but this cannot be seen in our illustration. The *sphenoid* or wedge-like bone is so named, not from any similarity to a wedge in shape, but from its being wedged in among so many other bones; for it is united to the other seven bones of the cranium, and to five of the face, all of which it in a great measure serves to bind together.



F. Frontal bone. P. Parietal bone. T. Temporal bone.
O. Occipital bone. S. Sphenoid bone. C. Cheek-bone.
J. Upper jaw-bone. L. J. Lower jaw-bone. N. Nasal bone.
I. Lacrymal bone. H. Hole leading into ear.

The vault of the cranium is smooth and regular, where it forms a roof for the protection of the brain; the floor of it is divided into six pits or deep hollows, for containing the different lobes of the brain. Numerous holes exist in the base of the cranium for the entrance of the nourishing arteries of the brain, for the exit of its veins, and for the passage of the various nerves which are to connect the brain with the organs of the senses and with the other parts of the body.

Those parts of the cranium which lie exposed to direct injury from the outside are formed of three layers, namely, an outer and an inner table, and an intermediate diploë. But it must not be forgotten that this arrangement does not exist in either the child or the old person. In the former all the bones are tough and elastic; in the latter the diploë is filled up by hard bone, and the whole cranium is therefore more liable to fracture. The outer table is formed of bone of ordinary compactness, such as is not liable to be cracked by moderate shocks; the inner, of much harder and more brittle bone (whence its name of *Tabula Vitrea*), which may be more easily cracked, but less easily cut or pierced. The diploë is of a soft spongy tissue, calculated to lessen the vibrations that are produced by blows on the outer table before they reach the inner and more brittle one. The arrangement is thus similar to that by which one might safely inclose a substance liable to injury either from being shaken or cut, within an inner case of hard porcelain, a middle one of soft leather, and an outer one of tough wood. The formation of the sutures seems to have the same end. The outer tables of the exposed bones have their edges finely dovetailed, and are

thus so immovably held together that none but a violently expansive force exercised at once on the whole interior of the cavity can separate them. The inner tables are simply apposed with a very thin intermediate layer of cartilage; an arrangement which is often imitated in works of art, in which tough materials, such as wood, are joined by mutually-fitting denotations; and brittle ones, such as glass or marble, by smooth edges and a layer of cement.

The top of the skull presents transversely an arch formed by the two Parietal bones, whose most prominent parts, like those of the frontal, occipital, &c. are stronger and thicker than any others—a circumstance adapted for greater resistance to force, whether applied directly against those parts, or to the summit of the arch, from which it would fall chiefly on them. The strength of this arch is further secured by the lower parts of the parietal bones being held in by the overlapping upper borders of the temporal and sphenoidal bones, other parts of which, passing across the base of the skull, hold the parietal bones, which by pressure from above might be made to start outwards or be pushed inwards, as beams hold the walls of a house from being driven in or out by the weight of the roof. Taking the whole upper part of the skull as a dome, the same strength of resistance to superincumbent pressure is obtained at every part by nearly similar means, especially at the coronal suture, where the parietal bones overlap the frontal at the supports of its arch, and are themselves overlapped by it at the summit of their own. In this regard also may be noticed the strength and thickness of the angular processes, and of the orbital arches extended between them, which serve as supports for the front of the dome; and the thickening of the bones along the course of the longitudinal and lateral sinuses resembling groins in masonry. See the engraving of the parietal bone in the Plate illustrating this article.

The Occipital bone shows at *e* the great hole for the passage of the medulla oblongata, the upper part of the spinal cord, to the brain. The bone is of somewhat hexagonal shape. The angle above and behind is the *occipital* (*a*), that before and below is the *sphenoidal* (*b*); the *parietal* angles are seen at *c*, and the *temporal* angles at *d*. The four cavities for the two lobes of the cerebellum and the two of the cerebrum are divided by the crucial ridges (*f*). Externally there is a transverse ridge (*i*), with the occipital protuberance (*h*) in the middle, from which descends to the hinder part of the great hole a sharp low ridge called the *occipital spine* (*g*). On each side of the anterior half of the great hole are placed the processes of the condyles (*j*), by which the skull articulates with the spine.

The Temporal bones have three portions, the *mammillary* (*A*), containing a large knob, called from its shape the *mammillary process* (*a*), which is what we feel behind the ear; the *squamous* (*B*), so called from the large scale-like or squamous plate (*c*), and remarkable for the *zygomatic process* (*d*), whose under surface forms the *glenoid* cavity for the condyle of the lower jaw to work in, while the remainder of the process runs on to join the cheekbone at *l*, and is called the *malar process*; and the *petrous* portion (*c*), so called because it is of almost rocky hardness—this also has a process like the two other portions, namely, the *styloid process* (*f*). It is in the considerable mass of hard bone of the petrous portion that the organ of hearing is contained.

The Frontal bone forms the forehead, and its shape has often caused it to be compared to a clam-shell. The bone is divided by the great orbital ridges of the eyes (*a*), ending at the outward corner in the external angular processes (*b*); the internal angular processes (*c*) are less defined, and the nasal process (*d*) separates them. Behind the nasal process is a notch which receives the *ethmoid* bone. The frontal sinuses are shown at *g*.

The Sphenoid bone locks all the other bones together;

its curious shape, like a bat with extended wings, is very remarkable. The part *f* is called the body, and contains two cells separated by a partition, whose crest is shown at *a*. The basilar process (*b*) connects with the occipital bone, the temporal plates (*k*) with the temporal and parietal bones, the orbital plates (*l*) form the back of the eye socket, and the spinous processes (*j*) are received in the triangular clefts between the petrous and squamous portions of the temporals. The transverse spinous processes (*d*) extend on each side from what is called the Turkish saddle, formed between the basilar process (*b*) and the olive-shaped process (*c*).

Finally, the Ethmoid bone, which lies at the bottom of the skull in front of the body of the sphenoid and between the two orbits, forming their inner boundaries, is seen in the Plate to be riddled with holes, through which the nerves pass from the brains. The ethmoidal cells are well seen at *a a*; the cribiform or sieve-like plate (*b*) is divided by the "cock's comb" (*c*), opposite to which descends the nasal plate (*d*) from the under surface of the bone.

The face consists of fourteen bones; six pair, and two single ones. The two upper jaw-bones form the principal part of the face. They meet in the middle line, forming the arch in which the upper row of teeth are set, and extend backward, forming the principal part of the roof of the mouth. A process runs up from each, separating the cavity of the nose from that of the orbit. In order that the face may be lighter, the body of the maxillary bone is hollow, the cavity communicating with the nose. The roof of the mouth is completed by the two palate bones. The firm part of the nose, from its roof to its bridge, is formed of two small pieces, meeting in the middle, called the nasal bones. These are liable to be broken, or knocked in, by a blow, an injury which occasions great disfigurement. The opening of the nose in front is seen in the skull to be of an oval figure, bounded by the two nasal and the two upper jaw-bones. Bounding the lower and outer parts of the orbits are the two malar or cheek-bones, making the prominences on the sides of the face. At the inner sides of the orbits are two little bones of the size and shape of the finger nail, called the lachrymal bones, because they form the chief part of the canals through which the tears find their way into the nose. Forming the partition of the nose, is a bone resembling a ploughshare in shape, whence its Latin name *roster*; and on each side, within the nose, is a spongy bone, for the purpose of extending the olfactory surface. Finally, the lower jaw is a single bone, its dental arch equalling in size that formed by the upper jaw-bones, and containing as many teeth. The fore part of this bone is the chin, extending back from which, and gradually separating from each other, are its sides, which terminate at the angles, and from the angles the branches rise nearly perpendicularly upward, to be attached by movable joints to the sockets in the two temporal bones.

Though composed of so many pieces, the whole skull fits firmly together by its various serrated sutures, and moves as one mass on the top of the spine; in fact the only motion that takes place between its parts is the opening and closing of the mouth. This is done by the lower jaw dropping and being again lifted, while the upper jaw remains unmoved. This arrangement holds good in all beasts and birds; it is only when we descend to the reptiles and fishes that we find both jaws moving, as in the crocodile and the shark.

The orbits are two cavities placed in the face, for containing the eyes. Each orbit is of a conical figure, the apex being behind, where the optic nerve enters it, and the base being in front; and it is much larger than is necessary for the size of the eye alone, this delicate organ being cushioned on a quantity of soft fat, in order that it may move with the greatest ease in every direction. The inner walls of the orbits are parallel, while their outer

walls diverge widely from one another, to give the eyes the advantage of as wide a range as possible.

SKULL, IN COMPARATIVE ANATOMY.—The skull or cranium is that part of the skeleton in the VERTEBRATA which forms the continuation of the BACKBONE or vertebral column. In its first beginnings it is merely a cartilaginous investment for the swollen anterior part of the nerve-cord or brain, and is supported by the termination of the notochord, an axial rod which takes the place of the vertebral column in the lowest vertebrates. This intimate connection of the skull and vertebral column suggested the "vertebral theory" of Goethe and Oken, according to which the skull corresponds in its ultimate constituents to four vertebrae, representing the four regions of the mature skull, occipital, parietal, frontal, and ethmoid. According to this view the basal part of the occipital region (basis-occipital bone), for instance, corresponds to the body or centrum of a vertebra, the neural arch being represented by two lateral pieces (the ex-occipital bones) and a median dorsal piece (the supra-occipital bone). This theory is disputed by Huxley and Gegenbaur—the skull, according to the latter, being composed of a much greater number of segments corresponding to the primary visceral arches.

In its first development the skull is a mass of cartilage surrounding the extremity of the notochord, sending forward two bars (*trabecula cranii*) which unite in the middle line and inclose a space, the pituitary space, in which lies the end of the true axis of the nervous system. By the formation of side walls and a roof a narrow oblong cartilaginous box is formed, protecting the brain. To this primordial cranium are added the sense-capsules, which, originally involutions of the integument, become attached to the brain capsule; these are the olfactory sac, attached to the front or ethmoid region of the skull, the optic capsules, which become closed and form the orbits for the eyes, and the auditory capsules, which at an early period become fused with the skull. The primordial cranium is also brought into connection with the respiratory and alimentary system by means of the primitive branchial or visceral arches, the first of which arches over the mouth and forms in its upper part first the upper jaw, and later the roof of the mouth, and in its lower part the lower jaw. From the upper half of this arch is formed, in the bony skull, the palatine, pterygoid, and quadrate bones, while the lower half, known as Meckel's cartilage, in the embryonic skull, is replaced by several bones, the articulare, angular, and dentary, of which the last bears teeth. The second branchial arch or hyoid arch is also attached to the skull by fibrous tissue, and in most fishes its upper part (*hyomandibular*) is the chief attachment of the first arch to the skull; but in higher forms the primitive upper jaw becomes fused with the skull.

In the lowest vertebrate, Amphioxus (LANCELET), there is no skull. In the Lampreys (Cyclostomata) the visceral skeleton is not developed, so that there are no jaws. In the sharks and rays among fishes the skull is still entirely cartilaginous, but in the ganoid fishes dermal bones begin to be developed on the surface of the head overlying the cartilaginous skull. These latter are membrane bones, and must be distinguished from the bones formed in the cartilage of the primitive skull, which in higher forms become fused with the membrane bones, so that in the mammalian bony skull, for instance, both elements are present. In the Teleostei and Amphibia these membrane bones begin to be greatly developed, and of them the premaxillae and maxillae usurp the place of the upper jaw. In the reptiles there is a complete bony skull. In this order and the birds the hyomandibular, the upper part of the hyoid arch, is much reduced and abuts on the auditory capsule, and the lower jaw is attached to the skull by the quadrate bone, a portion of the primitive upper jaw. In the mammalian skull, entirely composed of bones suturedly attached to each other,

the quadrate has also sunk into the auditory capsule, and the attachment of the lower jaw is effected by means of the squamosal, a membrane bone. See VERTEBRATA.

SKULL-CAP is the popular name for the species of the genus of plants, *Scutellaria*, belonging to the order LABIATÆ. The genus is distinguished by its ovate calyx, furnished at the back with a concave scale, which forms a hinge-like appendage closing on the front. The species are generally perennial herbs, widely distributed over temperate and subtropical countries. The Common Skull-cap (*Scutellaria galericulata*) is common in Britain on the banks of rivers, lakes, and ditches. It is about a foot high, with branched stems, oblong, serrated leaves, with short stalks, and long-tubed axillary blue flowers, all turned one way. The Lesser Skull-cap (*Scutellaria minor*) is a smaller tufted plant, with small pale pink flowers, found locally in marshy places in England. Some of the foreign species are cultivated in greenhouses for the beauty of the flowers.

SKULPIN. See DRAGONET.

SKUNK (*Mephitis*) is a genus of carnivorous mammals belonging to the family MUSTELIDÆ, which contains the weasels, badgers, &c. The Common Skunk (*Mephitis mephitis*) has a stoutly built body, about a foot in length, short legs, a long head with a blunt snout, and a long bushy tail, rather less than the body. The body is covered with long hair, the prevailing colour of which is black, with a narrow white streak on the forehead, and a broad triangular white patch on the nape, from which proceeds a broad band of the same colour along each side of the back; in some specimens the proportion of white is greater, while in others this colour is wanting. The claws on the fore feet are long and strong. The common skunk is found throughout temperate North America. In all the Weasel family there are anal glands beneath the root of the tail, which secrete a fetid fluid; but the skunk possesses this means of defence against its natural enemies in the very highest degree. When molested it raises its tail over its back, and ejects the secretion in two threadlike streams, with great force and accuracy. This fluid is of a deep yellow colour, and has the most nauseating stench known. The smell is so durable that it is perceptible on the spot where a skunk has been killed for many days, and it is impossible to remove the odour from clothes that have been defiled with it. Dogs, and even men, suffer severely from inflammation of the eyes when squirted with the secretion. The skunk is not a very active animal, trusting in the efficacy of its odour to keep its enemies at a distance. It inhabits burrows in the ground, and feeds on mice, frogs, insects, and also on fruits. It sometimes commits havoc among poultry and eggs. The skins can be prepared without being tainted with the secretion of the anal glands, and are used to a considerable extent as furs, being known in America in commerce as Alaska sable. The flesh is also esteemed by the Indians. The Little Striped Skunk (*Mephitis putorius*) is an allied but smaller species, found in the southern parts of the United States. Its fur is black, with numerous white stripes and spots. This species, if the glands are removed when it is young, is sometimes domesticated, and proves useful in catching mice. The White-backed Skunk (*Mephitis mephitoides*) is found throughout South America, and in Mexico and the south-western parts of the United States. It is a larger species than the common skunk, reaching a length of 2 feet, and has a short white tail; the back is white, sometimes marked with a black stripe down the middle.

SKY is the name commonly applied to the space which surrounds the earth, which appears to have the form of a concave segment less than a hemisphere.

The earth is surrounded by the atmosphere, which is charged with vapours and terrestrial particles; and if the sun be rising or setting, so that his light enters

obliquely into it, the violet and blue rays, which have less wave-length than the red rays, are partially absorbed, so that only the yellow and red (and sometimes the pale green as well) arrive at the eye of the spectator.

On the top of very high mountains, or in balloons at great elevations, the sky becomes dark, and the stars shine at all times. It is hence evident that if it were not for the innumerable reflections of the light from the sun or moon which take place in the atmosphere, total darkness would prevail from the instant of sunset (or moonset) to that of sunrise (or moonrise); and even during the day darkness would ensue, so that the stars would become visible every time that the sun is obscured by a cloud of sufficient density.

But these are merely results of known optical laws, and do not affect the main puzzle of the sky, which is, why does it appear blue? The opinion of a few years back, that it was because the strong red waves proceeded into space, while the weak (though more numerous) blue waves were reflected from the countless particles of vapour, dust, &c., in the air, has gone the way of all ingenious theories unsupported by evidence. Recent researches of Professor Tyndall, on the action of light on vapours, seem to point, however, to a really verifiable hypothesis. When a volatile vapour in great attenuation are received into a glass tube and exposed to solar or electric light, extraordinary changes take place, differing with the vapours examined; but all the experiments have one common phenomenon: they always begin with the formation of a *fine blue mist* or *cloud*. To see this the room must be dark, and the vapour-filled tube alone illuminated. But further, when we examine the light emitted from this cloud at right angles to the path of the beam, we find that it is polarized, an exactly analogous phenomenon to the light of the sky received at right angles to the path of the sun's rays, as analyzed by a Nicol prism, &c. The very finely attenuated watery particles of the uppermost strata of the atmosphere give us naturally the very medium which is produced artificially in this remarkable series of experiments; consequently we see it as a blue vapour, and the light it sends us is polarized.

SKYE (according to some, from the Scandinavian *skia*, cloud, and to others from Gaelic *skiannach*, winged, from its peninsulas almost separated from it like wings), is an island of Scotland, the second largest of the Hebrides, in the county and off the coast of Inverness, from which it is distant at the nearest points 3 furlongs. Its extreme length is about 48 miles; its mean breadth about 12 miles; but owing to its deeply indented coast no point is more than $4\frac{1}{2}$ miles from the sea. The area is 111,703 acres, and the population in 1881 was 16,889, of whom 8203 were females. The coast is bold, and many parts, composed of columnar trap, exhibit basaltic pillars scarcely inferior to those of the Giant's Causeway. Two caves are pointed out as hiding-places of Prince Charles. A third, the Spar Cave, has the appearance of being lined with marble, from the beautiful stalactite formations. The interior of the island is a lofty moorland, mainly of trap and gneiss, rising in the Cuchullin Hills to the height of 3220 feet in Seuir-nan-Gilleann, "the rock of the young men," and 3029 feet in Blaven. This range, called also Coolin, has more rugged grandeur in its jagged and peaked summits than any other in the British Isles. The scenery and geology are highly interesting throughout. For wildness and sublimity few scenes rival Loch Coruisk, with its margin of broken rocks, tier above tier, rising up to the Cuchullin Hills, which girdle the lake on one side with an insurmountable barrier. The eagle may often be seen wheeling round these heights, while the red deer descends from the mountain fastnesses to browse upon the scanty herbage on the margin of the lake. The soil varies a good deal, but as a rule is moist and poor, and its limited power

of production, the habit of the crofters of depending mainly on fishing, and the division of the holdings as the population increases, have caused great distress, which has of late years given rise to much agitation. At PORTREE, the only town, there is a manufactory of woollen goods.

SKYLARK. See LARK.

SKYROS, an island in the Ægean Sea, 17 miles in length in a N.W. and S.E. direction; the breadth varies from 2 to 7 miles, and the area is about 60 square miles. The island is divided into two nearly equal parts by an extensive bay called Kalamitza or Gran Spaggia, on the west, and by another, called Port Akhlu, on the east side. The southern half of the island is rugged and mountainous; Mount Kokkheos, the highest point, is 2566 feet above the sea. The summits of the hills are covered with oak, fir, and beech trees. The north is less mountainous, and it contains some good land, but it is very imperfectly cultivated. The population is only about 3000. Some wine, corn, wheat, and barley are exported; also madder roots, wax, honey, and oranges. The goats are of a superior breed. Skyros belongs to Greece. It was an old tradition that Achilles lay hid there, disguised in female attire, before the war of Troy. The capture of it by Achilles is mentioned by Homer; and the name of this mythic hero is still preserved in that of Port Akhlu. In B.C. 476 Skyros was taken by Cimon, the inhabitants were enslaved, and an Athenian colony was sent to them. It was the place of retirement of Theseus, who died there.

The only town, Skyros, stands on the north coast, it is a poor place, but it is remains of antiquity.

SLAG, the imperfect glossy or vitrifiable compounds which are produced during the reduction of metallic ores by various fluxes. In their raw state it is sometimes called cinder.

SLANDER consists in the malicious speaking of such words as render the party who speaks them in the hearing of a third person in action at the suit of the party to whom they apply. The mere speaking of the defamatory words instead of the writing of them is that which constitutes the difference between libel and slander. See LIBEL.

Slander is of two kinds: one, which is actionable, as necessarily importing some general damage to the party who is slandered; the other, which is only actionable where it has actually caused some special damage. The first kind includes all such words as impute to a party the commission of some crime or misdemeanor for which he might legally be convicted and suffer punishment, as where one asserts that another has committed treason or felony. It also includes such words spoken of a party, with reference to his office, profession, or trade, as impute to him malpractice, incompetence, or bankruptcy. If a party is in possession of lands which he desires to sell he may maintain an action against anyone who slanders his title to the lands, as by stating that he is not the owner. With respect to the second kind of slander the law will not allow a party to be indemnified from words which are not in themselves actionable, even although the words are untrue and spoken maliciously. But if, in consequence of such words being so spoken, a party has actually sustained some injury he may maintain an action for slander against the person who has uttered them. In such case the injury must be some certain actual loss, and it must also arise as a natural and lawful consequence of speaking the words.

In answer to an action of slander the defendant may plead that the words spoken were true, or that they were spoken in the course of a trial in a court of justice, and were pertinent to the case; or formed the subject of a confidential communication, as where a party, on application, *bona fide* states what he believes to be true relative to the character of a servant, or makes known facts merely for the purpose of honestly warning another in whom he is interested.

In Scotland slander or defamation has a wider range than in England. All words spoken to the prejudice of the good name, credit, character, or feelings of another are actionable, although no special damage can be proved; but mere abusive epithets, spoken in the heat of altercation (if not repeated afterwards), are not actionable.

SLANG is the name for unauthorized language. Many of our best and most vigorous phrases begin as slang before they earn their degree and are permitted dictionary rank. On the other hand, crowds of mere temporary vulgarisms have their brief hour as slang, and then die a natural death. Slang is, however, quite distinct from *cant*, the specially invented language of thieves, &c.

The Slang Dictionary of Hotten, which first appeared in 1865, is a most amusing and not uninstructional book. Many of the words of the original edition are now admittedly English. It reads oddly, too, to find "Mr. Spectator," in No. 135 (A.D. 1711), complaining of the adulteration of slang, and instancing *mob* and *incog* (for *mobile vulgar* and *incognito*) as frightful examples. *Cab* (for *cabriolet*), once as vulgar slang as *bus* and *gut* (for *omnibus* and *gentleman*) still fortunately are, has become a perfectly recognized English word. These give us samples of the slang of abbreviation. Then another large class of slang words is made of metaphors, often very ingenious. Take, for instance, the now indispensable word *chaff*, for a sort of good-humoured banter, as unsubstantial as the chaff of the miller. Another class results from pure invention, a comical sound fitting itself by secret affinity to some idea long seeking utterance, and admitted at once and gladly by most persons who are not precisians to swell their scanty store of expressions. Such a word is *lunplious*, now recognized as an excellent addition to speech, but pure slang when it first appeared, about the year 1830, in the universities.

Beyond these great classes are the slang of the gutter, picked up from thieves' cant, the slang of each business, trade, or profession, and the slang of the schools and universities, which latter, indeed, are the hotbed of the better sort of slang. The word slang itself is of Norwegian origin, and comes from *slanja*, to sling, the term *slanja kysten*, to sling the jaw, being taken as meaning "to abuse." This use of the word may be heard frequently among the lower orders, where much old true speech remains; and "he slanged me," when used for "he scolded or abused me violently," is good English, and by no means the vulgarity which it would be probably considered. A slang term once meant an abusive term; the meaning has altered somewhat with the centuries.

SLATE, according to the strictly scientific definition, is an indurated clayey rock, readily split into thin slabs along certain planes which do not completely correspond with the original bedding, but which have been produced by intense pressure or curious molecular changes subsequent to its deposition. [See CLEAVAGE.] In ordinary language, however, it is customary to apply the term to any hard fissile rocks capable of being used for roofing purposes. True slates are almost exclusively confined to the very old Cambrian and Silurian formations, and the largest quarries in the world are to be found in these strata in North Wales. The great Penrhyn quarry, near Bangor, is half a mile in length and more than a quarter of a mile in width, and is worked in the open in terraces upon thirteen successive levels, and no less than 3000 men are said to be employed in the industry. These slates are of Cambrian age, and so likewise are those of the Llanberis and many smaller quarries; but slabs of almost equal quality are obtained from the Lower Silurian beds in the neighbourhood of Ffestiniog and Aberdovey; and there are also numerous less important workings either of true slates or hardened shales at several localities in Cornwall, Devonshire, Leicestershire,

the Lake District, Perthshire, Inverness-shire, and Aberdeenshire. As a point of theoretical interest it may be mentioned that in searching for fossils in slaty rocks it is necessary to look upon the edges of the fragments, for the organisms are always disposed along the planes of original bedding of the deposit, and so are not visible upon the regular smooth cleavage surfaces, which are often nearly or quite at right angles to the true stratification.

SLAVE, SLAVE TRADE. The word *slavery* has several acceptations, but its complete meaning is the condition of a human being who is the property of another or others. Such was the condition of the *servi*, or slaves among the Romans and Greeks; such is still that of the slaves in Eastern countries, and of the negroes in many parts of Africa and South America. A mitigated form of it existed until recently in the case of the serfs in Russia and Poland, and of a similar class in India and some other parts of Asia. The Russian and Polish serf was bound to the soil on which he was born; he might be sold or let with it, but could not be sold away from it without his consent; he was obliged to work three or four days a week for his master, who allowed him a piece of land which he cultivated. He could marry, and his children were under his authority till they were of age. He could bequeath his chattels and savings at his death. His life was protected by the law. Very much like this was the condition of the Greek slaves, called *Helots*, who, like the serfs just mentioned, were the original inhabitants of the country, reduced to a form of slavery by foreign conquerors. They were bound to attend and fight for their master, and to work for him a certain number of days. They were tied to the soil, for which they paid heavy rent, but the produce of which was their own. They could not be sold, and were well protected by the law against ill usage. Again this condition is found in mediæval times in England. The villeins (*villani*) of the middle ages were a kind of serfs, but their condition varied considerably according to times and localities.

Slavery, properly so called, appears to have been, from the earliest ages, the condition of a large proportion of mankind in almost every country, until times comparatively recent, when it has been gradually abolished by all Christian states, in Europe at least. The condition of slavery constitutes one great difference between ancient and modern society. It existed among the Jews in the time of the patriarchs, and it still continues to exist in many parts of Asia. The Mosaic law regulated the condition of slavery. It drew a wide distinction between the alien slave and the native servant. The latter could not be a perpetual bondsman, but might be redeemed; and if not redeemed he became free on the completion of the seventh year of his servitude. Again, every fifty years the jubilee caused a general emancipation of all native servants.

In ancient times prisoners, if not killed, were reduced to slavery, being either distributed among the officers and men of the conquering army, or sold. Another source of slavery, though not so common as the first, was the practice of kidnapping men and women.

Among the Greeks slavery existed from the heroic times, and the purchase and use of slaves are repeatedly mentioned by Homer. The labours of husbandry were performed in some instances by poor freemen for hire, but in the Doric states by the *Helots* or serfs, already alluded to. The Doric states of Greece had few purchased slaves, but Athens, Corinth, and other commercial states had a large number, who were mostly natives of barbarous countries. The slave population in Attica, in the time of its greatest power, was more numerous than the freemen. There were private slaves belonging to families, and public belonging to the community or state. The latter were employed on board the fleet, in the docks and arsenals, and in the construction of public buildings and roads. The ancients were

so habituated to slavery that none of the Greek philosophers, refined and benevolent as many of them were, make any objection to it. In fact, the Greeks considered slavery to be founded on permanent diversities in the races of men.

The Romans, on the contrary, admitted in principle that all men were originally free by natural law (*jure naturali*), and they ascribed the power of masters over their slaves either to the *jus gentium*, that is, the universal usage of all nations, if the slaves were captives taken in war; or to the *jus civile*, when a man of full age sold himself. It was a rule of Roman law that the offspring of a slave woman followed the condition of the mother. Emancipation was much more frequent at Rome than in Greece: the emancipated slave became a freedman (*libertus*). Slaves had no rights, and were in most respects considered as things or chattels. They had no *connubium*, that is, they could not contract a Roman marriage; their union with a person of their own rank was styled *contubernium*; and even the Christian church for several centuries did not acknowledge slave marriages.

Public slaves were those which belonged to the state or to public bodies, such as provinces, municipia, collegia, decuriae, &c. The slaves of an inferior description were employed as rowers on board the fleet, or in the construction and repair of roads and national buildings. Those of a superior description were employed as keepers of public buildings, prisons, and other property of the state, or to attend magistrates, priests, and other public officers, as watchmen, lictors, executioners, watermen, scavengers, &c.

Private slaves were generally distributed into urban and rustic; the former served in the town houses, and the others in the country. For all the necessities of domestic life, agriculture, and handicraft, business, literature, and art, for all the imaginable varieties of a refined and luxurious people, in fact, there was a corresponding denomination of slaves. The chief supply was derived from Asia and Africa. In most countries it was customary for indigent parents to sell their children to slave dealers. Criminals were also in certain cases condemned to slavery, like the galley-slaves of our own times.

In the later period of the empire free-born persons of low condition were glad to secure a subsistence by labour on the estates of the great landowners, to which, after a continued residence for thirty years, they and their families became bound. These *coloni* could marry, which slaves could not. They bear a considerable resemblance to the serfs and villeins (*villani*) of the middle ages.

The number of slaves possessed by the wealthy Romans of the empire was enormous. Scæurus had above 1000 domestic, and as many rustic slaves. In the reign of Augustus a freedman who had sustained great losses during the civil wars left 1116 slaves, besides other property.

But in the earlier ages of the republic slaves were not very numerous, and were chiefly employed in household offices or as mechanics in the towns. It was after the conquests of Rome spread beyond the limits of Italy that the influx of captives was so great. Their price fell so low that they were looked upon as a cheap and easily-renewed commodity, and treated as such. The condition of the Roman slave, generally speaking, became worse in the later ages of the republic and under the empire; and many of the emperors, even some of the worst, interferred for his protection. After Christianity became the predominant religion in the Roman world it exercised in various ways a beneficial influence upon the condition of the slaves, without, however, interfering—at least for centuries—with the institution of slavery itself. Originally a slave was incapable of acquiring property, all his acquisitions belonging to his master; but by degrees this condition was mitigated, and it became the practice to allow a slave engaged in trade to consider part of his gains, called his *peculium*, as his own, and a stipulation being some-

times made that he should purchase his freedom with his *peculium* when it amounted to a certain sum.

The northern tribes which invaded the Western Empire had their own slaves, who were chiefly Slav captives (whence the word *slave*), distinct from the *serri* of the Romans or conquered inhabitants. In course of time, however, all the various classes of slaves merged into one, that of the *adscripti glebe*, or *serfs* of the middle ages.

With the discovery of America a new description of slavery and slave trade arose. The natives of America were too weak to undergo the hard work which their Spanish taskmasters exacted of them, and they died in great numbers. Las Casas, a Dominican friar, advocated with a persevering energy before the court of Spain the cause of the American aborigines, and it was suggested that negroes from Africa, a more robust and active race than the American Indians, might be substituted for them. The Portuguese were at that time possessed of a great part of the coast of Africa, where they obtained by force or but a considerable number of slaves. The demand for slaves in the Atlantic harbours gave the trade a fresh direction. The petty chiefs of the interior made predatory incursions into each other's territories, and sold their captives, and sometimes their own subjects, to the European traders. The first negroes were imported by the Portuguese from Africa to the West Indies in 1503. In the British colonies, especially in the latter part of the last century and the beginning of the present, much was done by the legislature to protect the negroes; courts were established to hear the complaints of the slaves, flogging of females was forbidden, the punishment of males was also limited within certain bounds, and the condition of the slave population was greatly ameliorated. Still the conscience of men had been awakened, a gradually increasing number objected to the principle of slavery, and they also appealed to experience to show that a human being cannot be safely trusted solely to the mercy of another. In 1772 the famous decision in the case of the negro Somerset put it beyond dispute that the moment a slave touched English soil he was free; but if he returned to his master's country he resumed his slavery.

The efforts of philanthropists were first directed to abolish the slave traffic which desolated Africa. Thomas Clarkson's labours, with the aid of the zealous men, chiefly Quakers, who early joined him, prepared the way. Mr. Wilberforce, who brought the subject before Parliament in 1788. But he was repeatedly defeated. At length, in 1805, an order in council prohibited the slave trade in the conquered African colonies, and in 1807 it was abolished by an Act of Parliament. During violations of the law occurred until Brougham, in 1811, carried a bill making slave trading felony, punishable by fourteen years' transportation, or imprisonment with hard labour. In 1824 the laws relating to the slave trade were consolidated, and it was further declared to be piracy, and punishable capitally, if committed within the admiralty jurisdiction. In 1837 this was changed to transportation for life. After Mr. Wilberforce's retirement Sir T. Fowell Buxton took charge of the movement.

The first French law abolishing the slave trade was a decree issued by Napoleon on the 29th of March, 1815, during the Hundred Days, after his return from Elba. It prohibited any vessel from fitting out for the trade and the sale in the French colonies of any negro obtained by the trade. The influence of Great Britain was strenuously exerted at the peace in 1815 to obtain the concurrence of foreign powers in the abolition, and the object has been steadily kept in view by this country. The consequence has been that now all the powers in Europe and America have passed laws or entered into treaties for prohibiting the traffic. Brazil, the only part of America in which slavery still legally exists, in 1885 decreed the gradual

emancipation of its slaves by government purchase. All persons, of whatever colour, now born in that kingdom are free. According to an official return there were in 1886 rather over 800,000 slaves in the country. The republics of South America, generally speaking, emancipated their slaves at the time of the revolution, and some of the Spanish and Portuguese colonies are now the last refuge of slavery in Christendom. The French abolished it in 1848, the Dutch in 1863, while the 22,000,000 of Russian serfs became free in 1865. Slavery was abolished by Spain in Porto Rico in 1873, and in Cuba the slaves are rapidly being set free. Only 50,000 slaves were found to be left in Cuba in 1886.

The celebrated Act by which slavery was abolished throughout the British dominions and £20,000,000 sterling voted as compensation money to the slave-owners, was passed in 1834. The emancipated negroes in the British colonies were put from that date to 1840, to ease off the change, on the footing of apprenticed labourers. Happily the African export of slaves is now well-nigh a thing of the past, owing to the fact that the foreign market has nearly died out. Within the continent of Africa a vast trade is still carried on, however, accompanied by associations of the most cruel and horrible description. The frightful extent and shocking inhumanity of the Zanzibar slave trade was exposed by Dr. Livingstone in letters from him published in 1872; and in the following year Sir Bartle Frere was despatched to confer with the rulers of these states as to its suppression. His mission was entirely successful, and treaties abolishing both slavery and the slave trade were ratified with the sultans of Zanzibar and Muscat in 1873 and 1875. Slavery was abolished in Egypt by special treaty with England in 1877; but the Moslem law, which permits slavery, was used with great effect to counteract the benefit of the law, and constant watchfulness had for many years to be exercised. The usual subterfuge to regain possession of escaped female slaves was for a false declaration of marriage to be made by the master, with false testimony suborned for the purpose to support him. The judges gasped at this or any other subterfuge if no European chanced to be present to enforce the law.

Under the name of the "coolie trade" or "labour traffic" a business sprang up within recent years, especially among the islands of the Pacific, scarcely less infamous than the slave trade. Vigorous measures were taken, however, in 1874 to place the business under very strict regulations and inspection.

Until 1863 the United States contained a population of 4,000,000 negro slaves. They were confined to the Southern states, where they were employed in the cultivation of sugar, rice, and cotton; and after the trade with Africa was prohibited, slave breeding was carried on in Maryland and Virginia in a systematic manner for the supply of the other states. For many years a strong party had existed in the Northern states who advocated the total abolition of slavery throughout the Union; and the bitter feelings engendered by the antagonistic interests between the North and South on this and other subjects were the cause of the great civil war. On the 22nd of September, 1862, a proclamation was issued declaring that all the slaves belonging to the Confederate owners who were in rebellion on the 1st of February, 1863, should be free. The triumph of the North converted this proclamation into a great reality; and after the war all the states made a virtue of necessity, and passed Acts for the entire abolition of slavery.

The American Colonization Society formed a free negro settlement in 1816 called Liberia, near Cape Mesurado, on the west coast of Africa. [See LIBERIA.] The English government has established a colony for a similar purpose at SIERRA LEONE.

SLAVO'NIA, a province of the Austro-Hungarian Empire, now politically united with Croatia, is bounded W. by Croatia, N. and E. by Hungary, and S. by Turkey. It is separated from Hungary by the Drave and the Danube, from Turkey by the Save, and it has the Illova on part of the western frontier. The territory thus bounded is divided into two parts, the province of Slavonia and the Slavonian Gränzland or Borderland. The area of the kingdom of Croatia, of which Slavonia now forms a part, is 16,773 German square miles, and the population 1,892,499. The area of Slavonia alone is 3643 square miles. A branch of the Carnian Alps, entering Slavonia from Croatia on the west, traverses it throughout its whole length, forming the watershed between the Drave and the Save, sending down numerous small streams into each, and terminating somewhat abruptly on reaching the banks of the Danube. Mount Papuk, the culminating point of the chain, is not more than 2700 feet above the level of the Danube. In many places the mountains are covered with forests. On either side they slope rapidly, and give place to a succession, first of lower hills and valleys, presenting a beautifully undulating surface, clothed with verdure, or covered with vines and orchards; and then of plains, which extend without interruption to the banks of the rivers, and are in some parts inundated twice and thrice a year. The soil is almost throughout of remarkable fertility. Grain, fruit—especially plums, for making *slivovtza*, the favourite beverage of the country—flax, hemp, tobacco, liquorice, and madder are extensively raised. The minerals include several mines of copper and argentiferous lead, abundance of iron, and exhaustless supplies of beautiful marble. The inhabitants are generally ignorant, and of unsettled habits. The climate, though cold on the mountains, is generally temperate and healthy. There are no manufactures of any importance, but the transit trade along the navigable rivers within which the country is inclosed, is considerable.

Slavonia is the only country which has preserved the name of the great Slavonian stock. The inhabitants call their country *Slavonska*, and themselves *Slaronatz*, and speak the so-called Illyrian or Servian tongue. Chief towns, Eszek, Peterwardein, Semlin, Karlowitz, and Posega.

SLAVS or **SLAVO'NIANS** (properly *Slov'ine*, from *Slow*, a word, as if "speaking" or "articulate," to distinguish them from other nations whom they called *Niemetz*, or mutes, or else from *Slava*, glory), the general name of a group of nations belonging to the Aryan family. It is a sample of the irony of fate that this once noble race fell so low as to give us our word *slave*. The Slavic race, which now extends from the Elbe to the Pacific, and from the northern ocean to the frontiers of China, Persia, and the Mediterranean, comprehends about 70,000,000 persons, divided into several nations, who speak various cognate dialects, and live within the dominions of Russia, Austria, Turkey, Prussia, and Saxony. According to Jornandes, they were formerly called *Venedi* (Wends or Winds); and Pliny says that they lived about the banks of the Vistula. Tacitus refers to them as *Venedi*, *Serbi*, and *Slavani*. The name *Venedi* was not of their own coining, but the other two were. At the time of the decay of the Roman Empire, when the Goths pressed westward, the Slavs occupied the abandoned territories; why, we know not as yet, possibly driven by Asiatic pressure from behind, possibly simply from a wish to improve their lot. When we first get clear descriptions of them, we find them occupying the large territory between the Vistula and the Dnieper, the Carpathians and the Dwina. We find them a quiet corn-growing people, great cattle breeders, and traders also, growers of fruit, brewers of mead, and sellers of their produce. Lübeck, Kiev, and Novgorod were among their chief marts. They were a cheerful, light-hearted, kindly, generous race; courageous, but by no means aggressive.

Such a race was evidently doomed to be the prey of fiercer barbarians. Accordingly, even in the third or fourth century, we find them for a time under Gothic domination. They freed themselves only to fall in the sixth century before the terrible Avars, who stole their property and their women, and taxed them in a horrible way; and who finally used them in battle with the Empire, by placing them in front as a sort of living shield. Emerging somewhat from this scourge, the Slavs were simultaneously crushed, degraded, and oppressed by the Germans on the one hand, and the Turks on the other; and finally were assailed by the Mongols from the eastward. Their peaceful virtues disappeared, their character took a dull, dogged cast, and settled into the profound melancholy which we know as the Slavic temperament. Whole provinces were reduced to slavery or crippled by crushing tributes; and all the good that remains of what might have been a fine national type, is the extraordinary fortitude under suffering, and powers of passive endurance which centuries of persecution have developed in the Slavs.

The first outcome of their troubles was a sense of burning wrong, developing into a desire to avenge upon those weaker than themselves the injuries they had sustained from the stronger. They soon found the weakness of the Empire, and made a great descent upon it as early as 527, when they besieged Constantinople, and nobody dared to encounter them. Belshams at last succeeded, more by presents than force, in removing this dangerous enemy. After that time they settled on the banks of the Danube, alternately ravaging the provinces of the empire or serving in its armies. They were soon afterwards conquered, as already mentioned, by the Avars (with the exception of those who were settled on the Danube); but the yoke of the Avars was at last broken by the Slavs, who rose against their conquerors and defeated them. In the seventh century, having concluded alliances with the Emperor of Constantinople, the Slavs entered Illyria, and founded new colonies under the name of Slavonia, Croatia, Servia, Bosnia, and Dalmatia. The Greek emperors favoured their settlement in the imperial provinces. In the seventh century there were Slav colonies in Thrace, in the vicinity of Thessalonica, and in Mæsia, the modern Bulgaria. The Peloponnesos was almost entirely Slav, and derives its modern name of the Morea in all probability from *more*, the Slavonian for "sea." A considerable number passed into Asia and settled in Bithynia and other provinces. At the same time Christianity began to spread among them. The sixth synod of Constantinople (680) enumerates the Slavs among the Christian nations.

In Russia, the present home of the vast majority of the Slavic race, the feeling of sympathy with brother Slavs abroad has of late years taken deep root and grown fast. It evinced itself in 1876, in a manner which took Europe somewhat by surprise. Roused by the atrocities perpetrated upon fellow Slavs in Bulgaria, the most pacific of Russian emperors was fain to give expression to the indignation of his people, and the refusal of Turkey to agree to the proposals of a European Conference led to the war of 1877-78, the chief result of which was the creation of the present Slav principality of Bulgaria.

The following are the chief Slavonic races as distinguished by their language and race-affinities, which are strongly marked.

A. Western Division.—1. The Czechs (pronounced nearly as *checkz*), who inhabit Bohemia and Moravia, and are scattered in some parts of Hungary and Silesia (over 4,750,000). 2. The Slovaks, who inhabit the north of Hungary (nearly 2,250,000). 3. The Poles, who inhabit the territory of ancient Poland, Silesia, and Prussia (9,500,000). 4. The Lusatian Wends, partly in Saxony and partly in Prussia (136,000).

B. Eastern Division.—5. The Muscovites or Great Rus-

sians, who have a considerable admixture of Finnish blood. They inhabit the north-eastern provinces of Russia in Europe (10,000,000). 6. The Russians, who are distinct from the Muscovites, are divided into Little Russians, who inhabit the ancient Polish provinces of the Ukraine, Podolia, and Volhynia, now incorporated with Russia, a part of the kingdom of Poland, Galicia or Austrian Poland, and some parts of Northern Hungary (over 16,250,000); and White Russians, who inhabit the western governments, a part of Lithuania, chiefly the provinces of Mohilev and Witepsk (1,000,000). 7. The Slovenes or Illyrians, who inhabit the Austrian provinces of Styria, Carinthia, Carniola, and Dalmatia (over 1,250,000). 8. The Servians, who inhabit Serbia, to whom may be added the Montenegrins and the Croats of south-west Hungary (6,000,000). 9. The Belgians and Bosnians (over 5,000,000).

Besides these still existent large nationalities, the far greater original extent of the Slavs may be traced easily by the names of the towns. Thus Rostock, Berlin, Potsdam, Zeitz are all Slav names. All Pommern (or Pomerania, which is simply Po-More, sea-people) and Mecklenburg are full of them. Utrecht was formerly called Wiltaburg, a Sow name, and there is enthusiastic antiquaries, who see the Slavic *Wiltan* in our Wiltshire, though this is doubtless an error, as an even easier derivation presents itself from Teutonic sources (Wilton, *i.e.* the town on the Wily).

Briefly passing in review these nine main divisions we find their origin to be as follows:—

The *Czechs* are the eldest of the Eastern division. About 150 and onwards they occupied the country of the *Boui* (*Bouie* or *Boie*, of the Ben), and are mis-called Bohemians just as the English are occasionally mis-called Britons. Clearly the Great Antelope Christianity in some slight measure at the point of the sword; but it was not till a visit of the chief of Bohemia, Borzoi, to Sviatopolk, king of the directly Christian Moravia, that the land really became Christian. When Borzoi found himself invited to sit on the floor as unworthy to meet the missionary Methodius at table, he was astonished at the honour paid to a priest, and on inquiring as to this new faith was converted. His wife Ludmila also embraced Christianity. After Borzoi's death and the death of his son, Ludmila's grandson Wencislaw, turned by her in opposition to the paganism of his mother, Ludmila's daughter-in-law, sought to continue his father's and grandfather's work, but perished at the hand of his pagan brother Boleslav. Wencislaw (or Wencislaus) was regarded as a martyr, and adopted as the patron Saint of Bohemia by the Christians. The title of King of Bohemia was first given by the Emperor Henry VI. to Wratias in 1086, and permanently adopted by Premislav in 1198. The crown passed to Ferdinand of Austria by marriage, December, 1526, and when he became emperor, in 1558, Bohemia was so closely connected with the empire, though its formal incorporation did not take place till 1582, by the treaty of Westphalia.

Moravia, partly converted by Charles the Great, sword in hand, in 801, became Christianized through a political alliance with the Greek Emperor Michael in 863. King Rostislav became a Christian, and induced Michael to send the famous missionaries Cyril and Methodius to teach his people the true faith. The first thing these missionaries had to do was to write the language, hitherto spoken only. They therefore invented the Russian alphabet, that is to say, they modified the Greek by introducing new letters to express the special sounds unknown at Constantinople. In this medium they wrote great part of the Bible in Old Slavonian, or ancient Bulgarian, the original Slavic tongue whence the others are derived. (Modern Bulgarian is among the most corrupt of the derivatives.) For this work they were summoned to Rome and reproved for using any other tongue than the Latin in their services. Their earnestness and piety won over the Pope entirely, and their splendid

career was permitted to continue. But the Roman canonists regard this as a piece of deplorable weakness on the Pope's part, and it has been openly said, "If John VIII. had held firm to the use of Latin he would have perhaps prevented the schism of the churches of the West and East, and the perversion of the Slavs" (Rohrbacher, xii. 354). Moravia was overrun by the Magyars or Hungarians in 907, after but thirty years of independence, and quickly sank back into barbarism. On gradually emerging again it was incorporated with Bohemia (1029), and with Bohemia fell to Austria. In our own times a demand for separate ministry and parliament was rejected by the Austrian emperor in 1871.

The *Slovaks*, like the Moravians, fell under Magyar domination, and still form the main population of Northern Hungary, preserving the tradition of their origin in their name and their tongue.

The *Poles* derive their name from the Slavonic *pole*, a plain—that is, the dwellers in the great plain of Central Europe. They are first heard of on the Vistula in the sixth century. In 965 Miecislav, duke of Poland, married a Bulgarian princess, and was converted by her to Christianity. He at once converted his people by edict. The severity of his method may be judged of by an example. Those who did not fast at the proper times had their front teeth pulled out. Against these harshnesses paganism made a good stand. But when in 1000 the Emperor Otto III. created Duke Boleslav (son of Miecislav) King of Poland, and the Latin element, already seen in Miecislav's later years, now became completely predominant in the church under imperial auspices, the Christianization of Poland began in good earnest. All Polish tendencies were westward, and the Eastern religious forms were gladly parted with. It is difficult to believe that Poland began with a Greek conversion, so completely Latin is it in its theology. See *POLAND*.

The *Lusatian Wends* or *Sorbs* (who form a little island of Slavs in the great German sea, as it were, lying partly in Prussia and partly in Saxony) get their names from *Lusatia* or *Lausitz*, marshy country, the *Srp* of the Serbs or Servians. They never called themselves Wends, though always so called by their German neighbours. Germans generally call Slovenish Wendish, though this is manifestly incorrect. The word Wend comes from the Latin *unda*, water, and is thus a Latinized equivalent of Lusatia.

Turning to the Eastern division we find first the Russians. The *Russians*, properly so called, were not Slavs, but a small body of Scandinavian foreigners—"Varangians"—who ruled the Slavs as the Normans ruled the English, and who, like the Normans, were in slow gradations conquered peacefully by their subjects, so that they became the most Slavonic of all the Slavs. The very grandson of the foreigner Rurik, founder of Russia, has a Slav name, Sviatoslav. *Ros* is the Slav name for the river Niemen, and many consider this the derivation of Russia, as it certainly is of Prussia (*Po-rousi*, people of the Ros); but, on the other hand, we have the clear distinction drawn for some little time between the fierce Russians and the somewhat dull Slavs. Russia began to turn Christian upon the conversion of King Vladimir (proudly called *Isapostolos*, *i.e.* equal to the apostles) in 988, when he married Anne, sister of the Emperor Basil. But down to the time of Peter the Great large traces of the ultimate Oriental origin of the Slavs remained in the seclusion of women, the long robes of men, the veneration of the beard, &c.

The *Slovenes* comprise the Styrians of Austria and the Slavs of Illyria, and are so much akin to the *Servians* that great efforts are being made to weld all three together in a South-Slavonic nationality with its own common language. A Slovenish-German dictionary was published at Ljubach in 1860, and still more recently an excellent grammar has appeared. The Slovenes have (or rather had, for it is now

only found in the ancient religious scriptures) an alphabet of their own called the Glagolitic, which is derived from the cursive Greek, as Cyrillic (Russian) is from the uncial Greek character. Although they are now unlike, the two alphabets in their earlier form show their common origin. The Slovenes had a period of honour in the fifteenth, sixteenth, and seventeenth centuries, when Ragusa was a vigorous republic, crowded with learned Greeks, refugees from the Turk, flourishing in commerce, and in alliance with Venice. It did not lose its independence till Napoleon annexed it to his new kingdom of Illyria in 1808. By the Congress of Vienna, Ragusa passed to Austria with the rest of the Slovene coast-people of Dalmatia.

The *Croats* or *Hrvat* get their name from the Slav name of the Carpathian Mountains, their original home, *Chrbet*. The Croats Slavonized the land that now bears their name in 610. They were annexed to Hungary in 1100, and passed with Hungary to Austria in 1526. Closely akin to both Slovenes and Croats are the *Servians*.

The *Servians* first made a name in Europe by their conquest of the Avars in the seventh century, after which for long centuries they did little more than harass the neighbouring Slav state of Bulgaria, the Servians being as a rule imperialists, the Bulgarian's rebels. In 1043 they expelled the officials of the Greek Emperor, and in 1050 Michael of Servia took the title of king, and was so recognized by Pope Gregory VII. Eventually the kingdom, which lasted till the fatal defeat by the Turks in 1389 at Kossovo, grew to considerable importance, and comprised Macedonia, Albania, Thessaly, and Bulgaria. After Kossovo, Servia was a tributary state, and was thoroughly subdued in 1459 by Mahmud. In 1801 it rose again under George Czerny, who became its prince; and in 1882 Prince Milan was proclaimed king. But the present kingdom of Servia is of course a very small dominion with comparison to that of the twelfth and fourteenth centuries.

Montenegro, for racial and linguistic purposes goes with Servia. In fact it is the only remaining fragment of the old Servian kingdom. After Kossovo (1389) these hardy Slav mountaineers alone preserved their independence against the Turk, and that at the cost of incessant fighting. In the war of 1876, after the other states made peace with Turkey, Montenegro continued the fight single-handed, and probably only the outbreak of the Russo-Turkish War of 1877 saved the heroic little Slav state from destruction.

The *Bulgarians*, properly so called, were an Ugro-Finnish race who conquered in the seventh century the Slavs of the Danube Balkan provinces, settled there ever since the third century. Next to their kindred the Huns, the *Bulgari* were the fiercest and most dreaded scourge of Europe. They were known as early as the reign of Theodoric the Ostrogoth; but it was not till the close of the seventh century that they attacked the Slavs of Mœsia, along the Danube, and having conquered them gave them their name, just as the English conquerors did with ancient Britain. The result, however, on themselves was rather that which came to our Norman than that which came to our English conquerors; for within two centuries the Bulgarians had become so identified with their Slav subjects, and have ever since so remained, that it is now only with an effort that their origin is remembered; and, what is very remarkable, not a trace of the real Bulgarian element remains in race, language, or customs. The early history of the Bulgarian kingdom is that of incessant warfare against the empire and the Christians. When the Emperor Nikêphoros, in 811, made an expedition against them, and burnt their king's palace, but perished three days afterwards at their hands, a sample of the ferocity of the original Bulgarians (as distinguished from the Slavs) is given by their mode of revenge. The emperor's skull was made into a national drinking-cup, and was used on all

occasions of importance. In the beginning of the ninth century the sister of King Bogoris was taken prisoner and was detained many years at Constantinople, where she became a Christian. On her return she endeavoured long in vain to convert Bogoris. At last a terrible pestilence occurred which devastated the land, but which stopped upon his granting his sister's prayer and receiving baptism. Cyril and Methodius (the apostles of Moravia) were sent to him from Constantinople to instruct him. Bulgarian was as yet only a spoken language, and the apostles had first actually to invent an alphabet, and then to translate the Scriptures. Later on Bogoris applied to Pope Nicholas I. for religious aid, which was freely given, and Bulgaria turned towards the Latin rite, whereupon Phôtios, patriarch at Constantinople, angrily remonstrated, as the Bulgarians were converts of the Greek Church; and from this formal difference the everlasting quarrel flamed up on the disputed points as to fasting, celibacy of clergy, procession of the Holy Ghost, &c.—a strife of years, ending in a permanent division of Christianity. At last, in 877, the Latin priests were dismissed from Bulgaria, which definitively threw in her lot with the Eastern Church. It is a very grave distinction between the two churches that while the Latin Church insists on precisely the same form and language over all the world, the Greek Church has always freely accommodated itself to the language and customs of its converts. Hence, as we have seen, the very characters of the language and the valuable monument of Old Bulgarian, the ancient tongue of the Slavs, preserved in the extensive translations of the Scriptures by Cyril and Methodius. While Old Bulgarian is full of the most interesting archaisms, modern Bulgarian, on the other hand, is the most reduced, as far as grammatical forms are concerned, of all the Slav tongues. The great period of the Bulgarian past is its career as an independent kingdom from the time of Bogoris onward, when it was reckoned a not unworthy match for the power of the Greek Empire. In 917 King Symeon defeated the imperial army under León Phokas and compelled the Emperor Romanos to sign treaties with him recognizing the independence of the Bulgarian Church, among other matters. Russian arms were too powerful for them in 968, when Svântoslav defeated the Bulgarians. The chequered struggle for liberty against the new foe left the Bulgarians too weak to resist the Emperor John Zimisjes in 971, and after that time their power was greatly broken, so that in 1019 the Emperor Basilios II. ("the Bulgarian-slayer") finally overthrew the kingdom and abolished the patriarchate and the independence of the national church. After nearly two centuries, by the close of the twelfth century, Bulgaria recovered her independence; but it was only by a constant struggle that it was fitfully preserved, and Stephen IV. of Hungary found the kingdom an easy prey in 1271. In 1392 the Sultan Murad conquered it for Turkey, and in 1396 Sultan Bajazet organized it as a province of the Turkish dominion. Its restoration to partial independence in 1878, after the Russo-Turkish War, under Prince Alexander of Battenberg; the gradual rise of national feeling till Russian influence was at a discount; the proclamation of September, 1885, decreeing the union of the part reserved by Turkey (Eastern Roumelia) to that already freed; the consequent plagues of Servia, leading to a Bulgaro-Servian war: the total defeat of Servia (1886); and the deposition of Prince Alexander by Russia in August, 1886, in an effort to recover her lost influence, are facts known to all readers.

There is very good information extant as to the religion of the early Slavs. They held the dual faith which is so often found in Oriental peoples, regarding the universe as a battle-ground for legions of good and evil spirits; and though their chief worship was directed to the spirits of good, whom they figured (in Hindu fashion) as many-

headed and many-limbed monstrosities, yet they also worshipped and sacrificed largely to the spirits of evil. These, as being cruel and malevolent, required kindred rites, and we read of human sacrifices with details of revolting tortures fit to sicken us with horror. The greatest respect was paid to the priests, who held the same position of authority among the Slavs as the Druids among the ancient Britons.

SLAV LANGUAGES AND LITERATURE.—The Slav tongues belong to the Indo-Germanic stock. All the kindred languages possess a rich vocabulary, and also a great number of prefixes and suffixes, by means of which an extraordinary number of new forms are made. For instance, by simply prefixing the letters *s*, *z*, *r*, *z* the verb acquires different significations. The declensions, of which there is a great variety, are formed by the inflexion of the termination. The participles unite the qualities both of verbs and adjectives; and as verbal adjectives they denote at once the quality of the thing and the determination of the time, thus serving the use of relatives, as *who*, *which*, and prepositions, as *after*, &c. There are no auxiliary verbs. All Slav languages possess a great facility of compounding words, and it is possible to form from native roots all the scientific terms which the languages of Western Europe have preferred to derive from the Greek and Latin. The verbs which possess the dual number are conjugated without the use of pronouns, and the preterites of the third person singular and plural designate the sex by a variation in the last syllable. The Slav languages possess great expressiveness and energy, and in power and capability they are not inferior to any European languages, and are in fact superior to many. As to sounds it may be observed that the Slavs possess every sound that other languages contain, except the English *th*.

The *Russian Language* may be divided into three dialects, of which the dialect of Great Russia or Muscovy, since the time of Peter the Great, has been formed into the present literary language of Russia. It differs from the other Slav languages in having an admixture of words and sounds of Finnish origin, to which circumstance is to be attributed its superior harmony, for the Finnish language is characterized by extraordinary softness. Russian language and literature may be divided into two sharply defined periods—that before the time of Peter the Great and that since his time. The first period gives us a rich collection of *balads*, or national cycles of songs, as truly national epics as the Nibelungen-hed of the Teutons; and also a wonderfully fine series of chronicles, from that of Nestor the monk of Kiev (1056-1114) onwards. The influence of Peter on the civilization of Russia is, indeed, one of the most remarkable events in the history of Europe. Since his reign a new literature has been formed in Russia, which is rich in almost every department both of poetry and prose composition.

The *Polish Language* is considered to be more flexible and euphonic than the other Slav tongues. In conciseness of expression it is largely inferior to any other tongue. The juxtaposition of many consonants gives the language a harsh appearance to the eye, but these consonants are softened in the pronunciation and melted together. It is the only Slav speech which has the French nasal sounds *en*, *on*, *in*; and comes nearer to the Czech than to any other of the kindred tongues. The brilliant period of Polish literature begins with the sixteenth century, and extends to the early part of the seventeenth; and the accession of Sigismund I., in 1508, may be considered as its commencement. The Reformation gave a great impulse to thought, and the translation of the Bible into Polish tended to the improvement of the national language, just as the English and German translations have done in those two countries respectively. Polish literature, during its brilliant period, exhibited an extraordinary development

of the national intellect. The Latin poets of this epoch also possess high merit, and show that the Latin language and literature must have been very successfully cultivated. The reign of Sigismund III., a narrow-minded bigoted king, produced an unfortunate change in the literary condition of Poland, his sole object, during a reign of forty years, being to extirpate all the confessions of faith which were opposed to that of Rome. But notwithstanding the decline of mental cultivation during this unhappy period, Poland produced some few authors of note; and notwithstanding the troubled history of Poland since the reign of John Casimir, the Poles, with the exception of the state of stupor into which they sank from 1717 to the death of Augustus III. in 1763, have distinguished themselves in most departments of literature. Even in the present distracted political condition of Poland the taste for their national literature still exists undiminished among the Poles.

The national *Czech Literature* of Bohemia is older than that of any other Slav country, and its monuments extend as far back as the tenth century. John Huss commenced a new period of literature for Bohemia as Luther did for Germany, and he introduced that simple orthography of the Bohemian language which is still used. Huss revised and corrected the old Bohemian version of the Bible, and also left behind him original compositions in the Bohemian language. Ziska, the celebrated leader of the Hussites, was also an author. The period from 1520 to 1620 is called by the Bohemians the golden age of their literature; and, indeed, during that period science and literature were successfully cultivated in Bohemia. The decrees of the Emperor Joseph II. (1774-84), for the introduction of the German language into all the schools of Bohemia, seemed a severe blow to the Bohemian language and literature; but the measure appears to have awakened the slumbering energies of the nation, and to have stimulated it to new exertions. The improved system of public education (for though the imperial decrees established the supremacy of the German over the Bohemian language, they promoted the progress of knowledge) began to exercise a salutary influence on the study of the national language and its literature; and in the latter part of the eighteenth century and in the present century Bohemian literature has received many valuable additions from the labours of those who have attempted to regenerate their national literature.

The *Serbian Language* has more resemblance to the Russian than to the Polish or Bohemian languages, and it is considered more melodious than any other Slav dialect. Closely akin to this is the *Slovenish* dialect of Dalmatia and Illyria, and the *Croatian* of Hungary. The oldest monuments of Serbian literature date from the thirteenth century, though the language of these early monuments is not the Serbian of the present day. There is a chasm of two centuries which followed the defeat of the Servians by the Sultan Murad I., an event which destroyed the national independence of the Servians. The Serbian was first employed as a written language by Dositeus Obradovich, who was born in 1739, and died in 1811 at Belgrade. In Serbia there are many Latin Christians who always use the Roman alphabet, while the Greek Christians retain the Russian characters. It is found, however, as is still more the case in Roumania, that the Roman letters are gradually asserting their superiority, and their use is extending.

The *Bulgarian Language* is now largely mixed with Russian, and its grammatical forms are so abraded as almost to destroy inflexion, so that from being formerly the great exemplar of the Slav speech before its division into dialects, it is now the most altered and philologically degraded of all these tongues. Fortunately the translation of the Bible by Cyril and Methodius in the ninth century has preserved this interesting and most valuable philologi-

cal monument in large specimens. As well as the Cyrillic literature, there are also six large and fine MSS. of gospels, homilies by the fathers, &c., dating from the eleventh and twelfth centuries, written in the Glagolitic character in Old Bulgarian, a treasure-house for the Slav philologists. The oldest of these is in the Vatican Library, and is known as the *Codex Assemanus*, from the monk who discovered it. With the subjugation of the Bulgarians by the Turkish Sultan Murad (1360-89) Old Bulgarian literature ceases. Modern Bulgarian literature is most noticeable for its many robber-songs, crude versions of the kind of literature familiar to us in our Robin Hood ballads.

The *Wendish* (or *Sorbish*) *Language* has in vain been sought to be stamped out by Prussian officialism. The Prussian Slavs cling to their tongue as the Welsh do among ourselves, though it is forbidden in school and church. They are all Protestants, and a considerable body of them emigrated to Texas in 1854, where they founded churches and schools, and where their beloved tongue is spoken in freedom in the market and the pulpit. The Wends possess many fine folk songs and folk tales, but no literature in the higher forms.

SLEEP. Sleep is a temporary cessation of sensory and motor functions, due, as far as we at present know, to a state of bloodlessness in the brain. The opposite state, that of a congested brain, produces a sleep-like condition which is called *coma*, and which resembles true sleep only in merely external characteristics. All parts of the body which are at work require periods of frequent rest. The respiratory muscles take four times the length of rest to every period of action, the heart takes about equal times, the brain in sleep takes, roughly, about a third or a fourth in healthy adults. While we sleep, all the restorative agencies are at work, and the tissues are being regenerated by the blood which the brain would otherwise be using. What we do not know, and at present do not even see our way towards knowing, is why the brain should thus become bloodless. What is the special stimulus of sleep?

True sleep is peculiar to the mammalia and to birds; the lower animals, indeed, rest from time to time, and withdraw themselves from the external world, but having no external eyelids, they cannot exclude all influence from without. Fish conceal themselves behind a stone or near the bank of a river, crocodiles hide themselves in the mud, and tortoises creep into holes. The higher animals likewise usually seek out some place of retirement to sleep in, and dispose themselves in a posture which either is maintained with little muscular effort, or is favourable to the preservation of warmth.

Animals in general require less sleep than man; thus, for instance, four hours are sufficient for the horse. Those animals whose blood circulates very rapidly, whose motions are peculiarly energetic, and their senses very acute, usually sleep more lightly, and for a shorter time than others. The timid herbivorous animals sleep for a shorter time, and less profoundly, than the bolder carnivora. In man the want of sleep varies at different ages; the new-born infant sleeps almost continually, while persons in middle life can do with less sleep than children or very old persons, and women require less sleep than men. From six to eight hours a day are usually passed in repose, but habit exercises great influence in determining the amount required. John Hunter and Frederick the Great did not sleep more than four hours daily, while some sluggish persons spend nearly half their time in slumber. Cases of abnormal sleep are not rare. In the French *Comptes Rendus*, 1864, a case is narrated where a lady who slept forty days when eighteen, and fifty days when she was twenty, slept actually nearly a year when she was twenty-four, from Easter Day, 1862, to March, 1863. She was fed with milk and soup through a hole formed most fortunately by the removal of a tooth.

In extreme old age much sleep sometimes becomes necessary. De Moivre, when eighty-three years old, was awake only during four hours out of the twenty-four; and Thomas Parr towards the close of his long life was almost constantly asleep. Children sleep very soundly, old persons are easily disturbed, men sleep more profoundly than women, and sleep is always sounder after considerable weariness.

There are some conditions which favour the occurrence of sleep. Stout and full-blooded persons, and those of an excitable but easily exhausted frame, require more sleep than such as are thin, or who, though equally excitable, are more energetic and less easily tired. Abundant food induces sleepiness. Wine and other stimulants have the same effect. A class of medicines is known by the name of narcotics, whose peculiar action is to procure sleep. In these cases it is much more probable that comatose sleep, i.e. the sleep of the congested brain, is produced; and this will account for the non-refreshing nature of such sleep. Ease and quiet of mind conduce to healthy sleep, but the weariness of hopeless grief and mental or physical fatigue, if not too extreme, are likewise followed by sleep. Certain external causes favour it, such as the warm bath or friction of the surface of the body. Extreme cold is a powerful and most dangerous narcotic; it induces a deep lethargy from which there is no waking.

Sleep invigorates body and mind when worn out by toil, and its occurrence in the course of a disease is one of the most favourable signs of returning health. After a night's sleep we are nearly an inch taller than before; the intervertebral cartilages, which had been compressed by bearing the weight of the body during the day, having regained their natural form and proportions. The powers exhausted by our intercourse with the external world recover themselves, and our senses in the morning are alive to all impressions. Sleep is, however, pre-eminently the rest of the brain, which, when fatigued by the constant action of the mind, becomes incapable of continuing that action, just as the eye, if long fixed upon one spot, ceases to perceive any object distinctly.

The time of sleep varies with different animals. Many animals are nocturnal, as owls, cats, bats, moths of various kinds, and many beasts of prey, who wake by night and sleep by day. In every case, however, sleep comes most naturally when the sensations to which the animal is most keenly sensitive are removed. Thus with ourselves darkness and silence are conducive to sleep, while light and noise help those animals who are dull of sense towards them. But even with us the habit is a strong factor in these matters. The dweller in London streets finds it long a hard task to get to sleep in the country away from the noise of wheels; the inhabitant of a seaside town is wakeful away from the roar of the shingle. The sleepy effect of monotonous reading is well known, and is of course due to the attention being gradually weakened and lulled by the vague, indistinct, oft-repeated sensation; but if the sleeper is not in good health, he will probably wake the moment the reader ceases his weary drone. The well-known peculiarities of sleep, or rather of the state between sleep and waking, are treated of in the articles DREAMS and SOMNAMBULISM.

Hybernation, or winter sleep, occurs in some Mammalia, in all the Amphibia, and in some of the molluscs and insect tribes. Birds do not hybernate; and the vulgar notion with reference to the sleep of the swallow in winter is erroneous. Hybernation is either perfect or imperfect. In the former, of which the marmot affords an instance, the lethargy is profound and undisturbed by any sense of thirst or hunger, and the animals do not awake until the hybernating period is completely past. In the latter, intervals of wakefulness occur, during which the creatures rouse themselves and seek for food, as in the case of many insects and spiders, also the hedgehog, bat, and dormouse.

The time during which hybernation continues varies much. In some animals it lasts for four months only; in others for five or six; but almost all awake either in March or April.

The approach of winter sleep is not sudden, but it comes on gradually, the activity of the animals diminishing as their sense of hunger grows less keen. In some animals, as in the hedgehog, a diminution or total loss of appetite precedes hybernation for some weeks. When hybernation is perfect, the senses become so completely blunted, that severe wounds and electric shocks are insufficient to rouse the animal.

The phenomena of organic life go on far more sluggishly during hybernation than in diurnal sleep. The pulsations of the heart sink to a fourth or in some cases a tenth of their natural frequency. The respiration becomes slow, intermittent frequently and for a long time, or even becomes altogether imperceptible.

SLEEP OF PLANTS. See MOVEMENTS OF PLANTS.

SLEEPLESSNESS, technically known as *insomnia*, is often found as an accompaniment of acute and chronic illness, and in a prolonged and severe form it is one of the most constant precursors of brain exhaustion and mental decay. But it also frequently occurs as a purely functional disorder, and its symptoms, though troublesome and even distressing, do not necessarily indicate the existence of any serious affection or disease. Dyspeptics are seldom sound sleepers, and enlargement of the liver is often attended by insomnia of an obstinate character. In such cases the patient often finds great difficulty in getting to sleep on retiring, but after sleeping one, two, or more hours, he wakes up and is unable to sleep any more, or if he does sleep the periods are short, unrefreshing, and troubled by disagreeable dreams. This particular form of sleeplessness is often induced by certain indigestible articles of food, or by some irregular combination of them, or even by suitable and wholesome food taken at an unsuitable time. In such cases the rational treatment implies care and attention to diet, the time for taking meals as well as their character being studied, with the use of such remedies as tend to improve the digestive powers and excite the liver to action. In respect to diet it is impossible to lay down rules for general observance, as so much depends upon individual peculiarities of constitution. Some persons, in order to secure refreshing sleep, are obliged to take their latest meal at least an hour or two before bedtime, while others find that to go to rest with an empty stomach is sure to result in prolonged wakefulness, a little light refreshment taken the last thing having a most salutary influence. Sleeplessness induced by indigestion should never be treated by opiates, as these as a rule only aggravate the symptoms complained of, while, on the other hand, a dose or two of blue pill or podophyllin will often effect a speedy cure.

Another very common cause of sleeplessness is excessive mental exertion when the brain is not thoroughly strong. If the brain is kept long at full strain, lasting until just before the time for retiring, it is often found impossible to obtain sleep. Owing to the excited condition of the nervous system, and the determination of blood to the brain, ideas and mental pictures follow each other in quick succession, and the efforts made to banish them only tend to make the wakefulness more prolonged and determined. In such cases it may be essential to avoid all study or brain work for some hours before retiring to rest, the interval being filled up by occupations of a diverting kind, and such as have a tendency to lead the mind away from that which causes stress and anxiety. Where it can be had recourse to, an evening walk, sufficiently brisk and prolonged to induce a moderate amount of fatigue, is often beneficial, and the same may be said of riding or driving in the open air. In all such cases it is most desirable that

the remedies resorted to should be of a hygienic character, and such as tend to improve the general bodily condition, for to continue the circumstances producing the over-strain, and to endeavour to force sleep by the use of opiates, is plainly to burn the candle at both ends, and to induce results of a serious character.

When from any cause a habit of wakefulness has been induced, the first essential is to ascertain and remove, if possible, the exciting cause, and then to adopt such measures as will restore the normal condition of health. Attention must also be paid to the physiological conditions which favour sleep, such as fresh air, bodily comfort, warmth, quietude, and regular hours for retiring and rising. A close and confined bed-room is very unfavourable to refreshing sleep, and while draught must be avoided care should be taken to secure an adequate supply of fresh air. Warmth too is very necessary, and many persons sleep all the better for having a fire in the bed-room, using a hot-water bottle for the feet, &c., while cases of troublesome and persistent insomnia have been cured by the practice of taking a warm bath the last thing before going to bed.

Profound grief and mental anxiety frequently banish sleep, and all the stronger emotions have tendencies of a similar kind; but generally, unless disease is present, a reaction ultimately follows, during which long-continued sleep comes and restores the wasted powers.

In conclusion it may be observed that all the measures of relief that have been suggested may be impracticable or may fail to act as speedily as the case may require, and then resort must be had to hypnotics and sedatives, of which many varieties are now available for the use of the physician. Among these, one of the best is the bromide of potassium, a remedy especially valuable in cases of sleeplessness caused by worry and over-work, or experienced during convalescence from an acute disease. In ordinary cases a dose of twenty grains at bedtime will be all that is required, larger quantities being necessary where the patient is suffering from delirium or the premonitory symptoms of insanity. Other remedies are chloral, hyoscyamus, Indian hemp, and opium in one or other of its forms, the latter being chiefly relied on in cases of severe pain and bodily suffering. Where hypnotics are had recourse to it is of great importance that they should only be administered under medical supervision, and that their use should not be continued after the need for them has passed. It may be inadvisable to abruptly discontinue their use, but the dose should be gradually lessened as the normal condition is restored, until the drug can be dispensed with altogether.

SLEET is snow which has become half melted while in the act of falling, so that it appears to be a mixture of snow and rain.

SLESWIG-HOLSTEIN. See SCHLESWIG-HOLSTEIN.

SLICK ENSIDES, a miner's term, applied to the grooved and polished sides of dislocations (or FAULTS) in rock masses. The appearances have been produced by the rubbing together of the opposing faces of the fracture during displacement.

SLIDE INSTRUMENTS, in music, are best known in the form of the trombone and the orchestral trumpet, where by the contrivance of one tube sliding within another the length of the sounding tube may be lengthened or shortened telescope-wise. The contrivance is of hoar antiquity, for slide trumpets on our trombone pattern have been excavated at Pompeii, buried over 1800 years ago. The advantage of slide instruments over keyed instruments lies in their exquisite adaptability to every variety of pitch, and their resultant power to play exactly in tune in any key.

SLIDE-RULE, a mathematical instrument, consisting of two scales, one of which slides in a groove beside the other. Both scales are precisely alike, and are divided in

such a manner that equal distances correspond to equal ratios; thus, the figure 1 being placed at the beginning, the interval from 1 to 2 is equal to that from 2 to 4, or from 3 to 6. The slide-rule may, in fact, be regarded as an instrument for the mechanical addition and subtraction of logarithms. It furnishes the means of performing approximately, by inspection, any sum in simple multiplication, division, or proportion, according to the following general rule:—To obtain a fourth proportional to three given terms, find the first and second terms, one on each of the two scales, then find the third term on the same scale as the first, and the number which stands opposite to it on the scale which contains the second is the fourth term required. Multiplication and division come under this rule by making unity one term of the proportion.

Besides these two scales the slide-rule usually contains a third, which is similar to the other two, except that the intervals between the divisions are twice as long. It is used in conjunction with the sliding scale for finding squares, square roots, and mean proportionals.

The degree of approximation afforded by the slide-rule may be stated at 1 per cent.

The first logarithmic scales were constructed by Napier, the inventor of logarithms, but the plan of making one slide in a groove beside the other is due to the Rev. William Oughtred. The usual length of the slide-rule is about a foot.

SLIDE-VALVE, an essential part of a steam engine, serving to open and close alternately the ports or passages for the steam into and out of the cylinder. In the most usual variety there are three ports, which we may call A, B, and C, opening respectively into the top of the cylinder, the air (or the condenser), and the bottom of the cylinder. The valve only covers two ports, so that when it is over A and B the steam from A passes off through B, and C is open to let steam in and drive the piston up. This carries the valve down, closes C (the steam of which now passes away through B), and at the same time opens A, so that steam passes in above the piston and drives it down. The slide-valve is so arranged as to be by the same action carried up, and so to prepare the next stroke.

SLIDING SCALE, in British legislation, was a device for regulating the prices of corn, grain, &c., by means of a variable duty levied thereon, the duty being lowered as the price increased, and raised as it fell. The first Sliding Scale Act was passed on the 15th of July, 1828; and the second on the 29th April, 1842. See *ANTI-CORN-LAW LEAGUE*.

SLIGO, a county of Ireland, in the province of Connaught, is bounded N. by the North Atlantic, N.E. by the county of Leitrim, S.E. by Roscommon, and S.W. and W. by Mayo. The greatest length E. and W. is 41 miles; the greatest breadth N. and S. is 38 miles. The area is 721 square miles. The population in 1841 was 180,886; in 1881, only 111,578.

Coast-line and Islands.—The coast from the mouth of the river Moy, at the western extremity of the county, runs along the southern shore of that great inlet of the Atlantic Ocean, of which Donegal Bay, Sligo Bay, and Killybeg Bay are subordinate parts. Sligo Bay is nearly 6 miles across at the entrance, and about 10 miles in length to the town of Sligo. It is divided into three subordinate inlets, Drumcliff Bay on the north, Ballysadare Bay on the south, and Sligo Bay in the centre. The mouth of the latter is protected by Coney Island (area, 388 acres), which stretches across the entrance, and forms a natural breakwater, within which large vessels, which cannot get up to the town, lie at anchor. There is another much smaller island in the bay, called Oyster Island, on which are two lighthouses; and westward from Coney Island extends a reef, on the western extremity of which, the Black Rock, dry at low water, a lighthouse has been built.

Surface and Geology.—The hills of this county form three principal groups. The Ox Mountains extend from the river Moy at Foxford, in the county of Mayo, north-east to the shore of Ballysadare Bay. The range which overspreads Fermanagh and Leitrim extends into this county, and occupies the north-east border; these form the second group. The highest point, called Tuskmore, is 2072 feet above the level of the sea. The third consists of portions of the Braughlieve and Curlew Mountains, and the hills round Lake Gara. The Ox Mountains form a considerable range, about 25 miles long and 5 or 6 in breadth. They consist chiefly of mica slate, with occasionally granite, hornblende slate, gneiss, and quartz rock. The highest point rises to 1800 feet. At their base the Old Red Sandstone and conglomerate are observed skirting the primary rocks on both sides of the range, and sinking below the Carboniferous limestone, which occupies those lower lands extending on one side to the sea, and, on the other, to the Curlew Mountains on the borders of Roscommon. The Braughlieve Mountains, rising in one part of the county of Sligo to 1346 feet above the level of the sea at low-water, belong to the Carboniferous group; and the Curlew Mountains to the Old Red Sandstone. The rest of the county is occupied by the formations of the Carboniferous limestone group. This county and the adjacent one of Mayo are traversed by trap dykes unexampled for length, directness, and parallelism. Their direction is nearly east and west. Trachyte, a formation not observed elsewhere in the British Isles, is found on the shores of Killybeg Bay.

Copper and lead mines were formerly wrought in the primary district to which the Ox Mountains belong; but at present they are not in operation. A considerable part of the district, extending northward from the foot of the Ox Mountains to the sea, is covered with bog; and there is a large portion of it in the south of the county, but very little in the district which lies north of the town of Sligo.

Rivers and Lakes.—The western side of the county is watered by the Moy and other smaller streams which flow into Killybeg Bay, or into the open sea. The Owenagrow has part of its course in this county and part in Mayo. It joins the Moy above Foxford. The united stream touches the western border of the county just below the town of Ballina, and forms the boundary of the county of Sligo and Mayo, until it falls into Killybeg Bay, 10 miles from its mouth. It is navigable for vessels of considerable burden up to Ballina.

The lakes are tolerably numerous, and have an aggregate area of nearly 20 square miles. Lough Gara, on the southern boundary, 222 feet above the sea at low-water, has an area in this county of 3684 acres, or above $5\frac{1}{2}$ square miles. The portion of Lough Anow in Sligo, in the south-eastern corner, is 181 feet above the level of the sea, and has an area of 2977 acres, or $1\frac{1}{2}$ square miles. It is studded with islands, and is very picturesque. The river Anow flows from its north end, and after a course of 20 miles falls into Ballysadare Bay. Lough Gill, on the eastern boundary, 20 feet above the level of the sea, has an area of 3131 acres, or nearly 5 square miles, in this county, besides a portion in Leitrim. The scenery of this lake is so beautiful that it is known as the Northern Killarney. Among the small lakes are Lough Talt, Lough Eskay, on the Ox Mountains, and Lough Car or Glencar, partly in Sligo and partly in Leitrim.

Soil, Agriculture, &c.—The vicinity of the town of Sligo is a plain of great fertility: in the west the soil is light and gravelly, with large tracts of bog; in the north it is thin and poor, but in the southern portion of the county there are considerable areas of corn land and pasturage. Near the town of Sligo lime and animal manure are used, as well as seaweed; but in most parts seaweed alone is employed. The meadow lands are generally rather

poor. The occupations of the people are mainly agricultural. Until the last few years they were chiefly engaged in tillage, but more land is now used for pasturage. The fishery district comprises 112 miles of coast.

The manufactures are unimportant, consisting only of a few coarse woollens and linens for home use. The Midland Great Western Railway crosses the county, which is divided into six baronies, and contains forty-one parishes. It lies in the Connaught circuit, and the assizes are held at Sligo. It returns two members to Parliament.

History and Antiquities.—This part of Connaught was long the scene of warfare between the descendants and family of Roden O'Connor (the last monarch of Ireland), in their struggle for the principality. Hugh O'Neal, chieftain of Tir-Owen or Tyrone, was defeated near Ballysadero (1200) in the attempt to reinstate Cathal Croobhderg, or Cathal of the Bloody Hand, who had been dethroned by his brother or kinsman Canach, supported by the Anglo-Normans under De Burgo. Some of the Anglo-Norman settlers were engaged on the side of Cathal. In 1215 the Castle of Sligo was built, and having been destroyed by the natives, was restored about the beginning of the next century. A Dominican abbey was erected at Sligo in 1332 by the Earl of Kildare, the ruins of which are very fine. In 1588 three ships of the Spanish Armada were stranded at Sligo Bay.

The relics of antiquity are numerous. There are many cromlechs and other supposed Druidical monuments; and several remarkable caverns, the origin and purpose of which are unknown. Bails, or hill-forts, are numerous in all parts of the county; and at Drumeld is a round tower of great dimensions and coarse construction. The ecclesiastical and castellated ruins of a somewhat later date are also numerous: several of the monastic churches have been converted to parochial use.

Sligo, the chief town of the above county, a seaport and municipal borough, 131 miles north-west from Dublin, is situated on both sides of the river Gurroque (from the name of which, *Sligach*, "shelly water," Sligo is derived), where it falls into Sligo Bay. It is distant 69 miles S.S.W. from Londonderry, and is connected with Dublin by the Midland Great Western Railway. The port and harbour have been much improved by the erection of an extensive quay and warehouses outside the bar, and small vessels can now come up to the town. Ships of larger size anchor in the Pool, which is safe and secure, but inconvenient for discharging or taking in cargoes. The river is crossed by two bridges. The left bank below the old bridge, which is the lowest, is lined with quays and wharves. The streets in the old quarters of the town are narrow and ill-paved; but in the newer parts they are wider and well-paved, and there are convenient market-houses and many large stores. Sligo contains a county court-house, barrack, prison, infirmary, fever hospital, union workhouse, custom-house, two churches, a Catholic cathedral, chapels for Methodists, Presbyterians, and Independents. The Ulster Bank and a model national school are both beautiful edifices, and a handsome town-hall was opened in 1868. This is the most important commercial town in Connaught, and has a good trade. The retail business is extensive, articles of every kind in demand being supplied to a wide and populous district. The exports consist chiefly of provisions, grain, flour, butter, and all kinds of agricultural produce; and the imports of colonial produce, timber, coal, iron, and salt. Its trade is carried on chiefly with Liverpool, Glasgow, and Londonderry. There is a valuable salmon fishery in the river. The town has several flour mills, distilleries, and breweries. The municipal borough is divided into three wards, and is governed by six aldermen and eighteen councillors. The assizes for the county, and quarter and petty sessions, are held in this town. The population within the municipal limits in 1881 was 10,808.

SLING, an instrument with which stones or other missiles may be thrown to a great distance. In its simplest form the sling consists of a thong of leather, or a piece of cord or some woven fabric, both ends of which are held in the hand of the slinger. The stone or missile is placed in the fold or double of the thong, which is made wide at that part, and sometimes furnished with a slit or socket for the purpose of holding it, and the sling is then whirled round to gain an impetus. In the hands of an expert slinger, this instrument may be made to project missiles to a great distance and with surprising accuracy.

The simplicity and portability of the sling, and the facility with which supplies of ammunition for it might be obtained, led to its extensive use among the ancients as a weapon of war, as well as for other purposes. Its common use among the Jews is intimated by several passages of Scripture. Several ancient paintings represent it as in vogue at an early period among the Egyptians. In the Greek and Roman armies the light troops consisted in great part of slingers. The instrument is not mentioned by Herodotus, and it is an error to assign the use of it to the Persians. The sling was long employed, both as an offensive weapon and otherwise, in England. Slingers formed a part also of the Anglo-Norman soldiery.

SLIPPER ANIMALCULE. See INFUSORIA.

SLIV'NO (*Ialimio*), a town of Roumelia, at the southern base of the Balkans, near the left bank of the Tunja, 75 miles north of Adrianople. It has an important fair, and manufactures guns, cloth, attar of roses, and its neighbourhood yields silk and wine. There are about thirty mosques, three Greek and one Armenian church. The population, chiefly Turkish, is about 25,000.

SLOANE, SIR HANS, BART., was born at Killyleagh, in the county of Down, Ireland, 16th April, 1660. About the age of twenty he went to London, and for four years devoted himself to the study of medicine and the collateral sciences. In 1683 he set out for Paris, and during his stay there attended the anatomical lectures of Duverney, and those on botany by Tournefort. He passed a year at Montpellier, spending much of his time in collecting plants, and after having travelled through Languedoc with the same purpose, returned to London in 1684. In 1685 he was elected a fellow of the Royal Society, and of the College of Physicians in April, 1687. He next accompanied the Duke of Albemarle to Jamaica in September, 1687, but owing to the duke's death returned to England in 1689.

The plants which he brought with him amounted to 800 species, and with other objects of natural history, formed the nucleus of his museum. He was appointed physician to Christ's Hospital in 1694, and held the office for thirty years.

In 1693 he was chosen secretary to the Royal Society; in 1712, one of the vice-presidents. George I. created him a baronet in 1716, and appointed him physician-general to the forces; he was elected president of the College of Physicians in 1719, and held the office till 1735. In 1727 he was appointed physician to the king; and in the same year succeeded Sir Isaac Newton in the president's chair of the Royal Society. He had purchased an estate at Chelsea in 1720, whither he retired in 1740. He died there 11th January, 1752.

Sir Hans Sloane directed that at his death his museum should be offered to the nation for £20,000, about one-fourth of its real value, and the government accepted the offer. It contained 200 volumes of dried plants, and 30,600 other specimens of objects of natural history, besides a library of 50,000 volumes and 41,000 MSS. By an Act passed in 1753 the collections were secured, and with the addition of the Harleian MSS. and the Cottonian Library, as well as of the Royal Library, presented in 1757, they formed the original contents of the British Museum, opened in 1759.

SLOE or **BLACKTHORN** (*Prunus spinosa*) is a shrub belonging to the same genus (*Prunus*) as the PLUM (*Prunus domestica*), from which it is chiefly distinguished by its dark purple spiny branches. It is usually a shrub, but it sometimes forms a low tree from 15 to 20, or sometimes as much as 30 feet high. The roots are creeping, and throw up numerous suckers, on which account it does not make a good hedge-plant. The leaves are dark green, elliptical, downy beneath, and sharply toothed. The flowers are small, white, and solitary, generally appearing before the leaves in March and April. The fruit is small, dark purple, and very austere; it is ripe in October. The bark is black, whence the name blackthorn. The sloe is common in Britain, and is also found in Europe, Western Asia, and North Africa. The wood, though hard and taking a fine polish, is not of much value, as it cracks very readily; but the upright shoots are much valued for walking-sticks. The bark is bitter and astringent, and has been used as a febrifuge. The leaves are largely used in the adulteration of tea. The fruit is sometimes used for making a preserve, and its juice is much used in the manufacture of cheap port wine. From its wild intricate growth the blackthorn can be used to produce a good effect in parks, &c.; and the branches make good dead hedges. It is propagated either by suckers or seed.

SLOOP, a kind of sailing boat. The term is hardly now distinguishable from "cutter;" but originally the sloop was known by her smaller sails and her fixed bowsprit. In the navy any vessel between a corvette and a gun-boat is called a sloop.

SLOTH (*Bradypodidae*) is a family of mammals, belonging to the order *EDENTATA*. In the article At the general characters and habits of the sloths have been described; a few words may now be said about the different species. The typical genus, *Bradypus*, is distinguished by having three digits on the fore limbs, and the first molar tooth on each side in both jaws very short. The old species, *Bradypus tridactylus* (the Ai or three-toed sloth) is now divided into several. One of these is the Collared Sloth (*Bradypus torquatus*), which has round the neck a collar of long black hair; the hair on the back is pale orange, and that on the under surface of a rusty colour; the face is black and naked. The true Ai, according to Dr. Gray, belongs to a nearly allied genus *Arctopithecus*; it is the *Arctopithecus flaccidus*, and has very long flaccid gray hair mottled with white. The two-toed sloths belong to the genus *Cholæpus*, and are distinguished by having only two digits on the fore limbs, the lower jaw projecting in front, and the first molar longer and larger than the others. The Unau (*Cholæpus didactylus*) varies greatly in colour, the hair of the body being pale or dark brown, and sometimes forming a whitish crest on the back of the head. Hoffmann's Sloth (*Cholæpus hoffmanni*) is remarkable for having only six vertebrae of the neck; its body is covered with pale brown hair, whitish at the tips, and darker on the limbs.

SLOTH-BEAR. See BEAR.

SLOUGH, a town of England, in Buckinghamshire, 18 miles W. of London, and 2½ miles from Windsor, by the Great Western Railway. The parish church was enlarged in 1878, and extensive railway buildings have been erected. In the neighbourhood is the red brick house where Sir William Herschel lived, and in the garden of which his great telescope was set up; here most of his discoveries were made, including that of the planet Uranus. Here, too, his son, Sir John Herschel, prosecuted for the most part his examination of the star clusters and nebulae. It was at Slough, soon after the opening of the Great Western Railway, that the electric telegraph was first used successfully for the apprehension of a criminal, the message giving the description of James Tawell, the Quaker, who had killed Sarah Hart in the hamlet near at hand, having

been despatched from the little wooden cabin at the cutting side to Paddington while the murderer was endeavouring to escape by train to the metropolis. Population, 5095.

SLOVAKS, the Slavs of Northern Hungary, once part of the great Moravian kingdom, conquered by the Hungarians at Presburg in 907. See SLAVS.

SLOW-WORM. See BLIND-WORM.

SLUG (*Limacidae*) is a family of molluscs belonging to the order *GASTEROPODA*, and section *Pulmonifera*. The slugs differ from the *SNAILS* (*Helicidae*) in having a very small flat shell, usually concealed by the mantle, placed over the respiratory cavity, and sometimes represented merely by a few calcareous granules. The body is straight and elongated, with the foot not distinct from it, and the creeping disc of the latter extending the whole length. The head and tentacles are retractile, the latter being four in number, cylindrical, with eyes at the tips of the upper pair. The true slugs, belonging to the genus *Limax*, have a small flat oblong shell, completely inclosed within the mantle, which is shield-shaped and placed on the anterior part of the back. The foot is keeled and pointed behind. The species are numerous, found in the greatest abundance in temperate Europe. They inhabit damp situations in cellars, gardens, fields, &c., hiding during the day under stones, and coming forth in the evening to seek their food, which consists chiefly of vegetable matters. They often climb trees, from which they can lower themselves by a viscid thread formed by the mucus which they secrete in abundance. When alarmed they withdraw the head beneath the mantle and contract the foot. In times of drought or frost they bury themselves in the ground. The eggs are laid in clusters in spring and summer. The Great Gray Slug (*Limax maximus*) is abundant in England; and other British species are the Lesser Gray Slug (*Limax agrestis*), and the Black Slug (*Limax ater*).

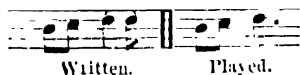
The genus *Arion* is distinguished from *Limax* by having no true shell, its place being taken by a few calcareous granules. The mantle is nearer the head, the back is covered with tubercles, and the tail is terminated by a mucus-gland. *Arion ater* is abundant in Britain.

The genus *Testacella* is distinguished by having a small ear-shaped shell placed at the extremity of the body, which is elongated and tapering towards the head. The species of this genus burrows in the ground to a depth of 2 or 3 feet, coming to the surface only at night; they prey on earthworms, which they pursue actively and devour whole with the greatest voracity. *Testacella* is found, though rarely, in England; it also occurs in Southern Europe and the Canary Islands.

The slugs of our fields and gardens often commit devastations of serious consequence. Gardeners are constantly racking their invention to free themselves from their devouring hosts. Quicklime, soot, fine coal ashes, and sawdust have been used as defences for young and tender plants. The virtue of the first is soon exhausted, and the slugs after a while do not care much for the second; but if the soot be plentiful and frequently renewed, it will keep them away in great measure. Coal-ashes, not too coarse, and sawdust annoy them by sticking to their feet and impeding them. A stout, coarse horsehair line, such as is used for hanging clothes out to dry, coiled round the stems of wall fruit-trees and stretched along the wall, will operate as a protection to the fruit from both snails and slugs, in consequence of the bristly surface presented to them, and which they shrink from encountering. Care must of course be taken that they do not get under it. Watering evening and morning with strong fresh lime-water is said to have a good effect, for it penetrates about the roots of the plants and into the earth, where they lie hid.

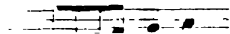
In the Plates *GASTEROPODA*, three species of slugs are represented, fig. 113, *Limax flavus*, fig. 114, *Arion ater*, and fig. 115, *Testacella maugei*.

SLUR or **TIE**, in music, a curved line more or less extended, as may be required, drawn over two notes on the same line or space. It signifies that the second is not to be sounded as a separate note, but merely held out its due time; as



Written. Played.

When such a line is drawn over notes on different degrees, those notes are said to be *legato*, i.e. tied; and they are to be played in a smooth, blending manner; as



The confusion between the legato mark and the tie was sought to be obviated by Professor Sterndale Bennett, of Cambridge, by the use of — for the one sign, and — for the other; but his excellent idea did not take root.

The slur is also used in violin music as a bowing mark, covering all the notes to be taken in one stroke of the bow; and a fourth use is for vocal music, to bracket together all the notes to be sung to one syllable.

When the slur covers several notes marked with accento dots, as

it is held to indicate a greatly modified form of the staccato. In violin music such notes would be taken as detached notes all in one bow, in contradistinction to the ordinary staccato with separate bowing to each note.

SMACK, a small vessel with one mast, commonly rigged as a sloop, and used in the fishing and coasting trade. The word is a corruption of the Old English *smacc*, a word akin to "snake," and given to boats because they glide smoothly through the water like snakes. *Smack* is the Dutch form of *saucer*.

SMAL'KALD, LEAGUE OF. See SCHMALKALDIC.

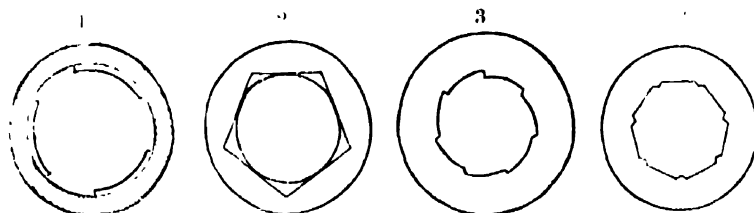
SMALL ARMS. *Historical.*—The earliest type of handgun seems to have been nothing less than a miniature cannon, an iron cylinder fixed on a straight stock, by which the weapon was carried and pointed, and it was discharged by applying a lighted match to the touch-hole. It was used in Europe as early as the end of the fourteenth century, and seems to have been at first as dangerous to friends as to foes; and there were not wanting those who said that the only advantage of the "hand-gun" lay in the terrifying noise it made. The next stage in the progress of small arms was the invention of the *arquebus* (see Plate I. fig. 1), in which the lighted quick-match was conveyed to the touch-hole by a sort of lock, which moved forward on being released by a trigger. This was fired with the butt resting on the chest, but the Germans introduced a crook in the stock, so that the barrel became more horizontal and a kind of aim could be taken. The *wheel-lock* or *rose-lock* (fig. 2) was the next improvement: in it the quick-match was replaced by a piece of iron pyrites, and beside the touch-hole there was a steel wheel which was caused to revolve rapidly by means of a spring; when the trigger released the lock it struck the pyrites against the wheel, and thus produced sparks. This weapon had for a rival the less expensive *snaphaunce* (fig. 3), in which the wheel was replaced by a flat piece of furrowed steel, and this arm was in turn superseded by the flint rock (fig. 4),

which was brought to perfection by Joe Manton, only to be eclipsed by the *percussion* gun (fig. 5), in which the charge was ignited by the lock striking a cap containing fulminating composition. This was a great advance. With the flint lock ignition was always uncertain, and it was almost impossible to keep the priming dry on a wet day; besides this, the large touch-hole caused a great escape of gas and consequent loss of power. With the copper cap ignition was almost certain.

Fulminating powder seems to have been discovered in France as early as the end of the sixteenth century, but it was not until Berthollet discovered fulminate of mercury in the end of the eighteenth century, that there was any attempt to apply this principle to the ignition of the charge of fire-arms. The first success in this direction was achieved by an Aberdeenshire parish minister (Forsyth), and his inventions were followed by a succession of improvements culminating in the modern copper cap.

Breechloading is of great antiquity, and seems to have been adopted even by the Indians and Chinese in loading their earliest cannons, but it was always dangerous and was supplanted by muzzle-loading, owing to the difficulty of making the breech parts fit accurately enough to prevent the escape of gas. There are many flint-lock breechloading guns and pistols in museums, but it is almost solely the skill of our modern mechanics, and the perfection of their tools, that we have to thank for the success of modern breech-loaders. The idea is old, it is only its successful execution which is new.

Rifling is known to have been used in Germany in 1568. In the earliest examples, the grooves are straight, and this would certainly improve the shooting, as the residuum



1, Muzzle of Snider Rifle. 2, Boucher's Pentagonal Grooving. 3, Ingram's Ratchet System. 4, Muzzle of Martini-Henry Rifle.

of the powder would settle into the hollows or *grooves*, while the projections or *lands* would make the lead projectile hit the bore more tightly. Spiral rifling is first referred to in a Swiss law of 1563, and it is certain that Bavarian rifle regiments existed as early as 1615.

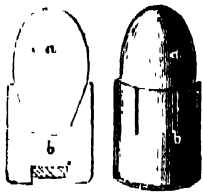
Fire-arms may be divided into two classes—*military*, which are intended to destroy human life; and *sporting*, which range from the almost toy 28-bore shot gun to the heavy and powerful elephant rifle.

Military Rifles.—From the age of Blenheim and Ramillies down almost to the eve of the Crimean War, all our battles were fought and all our victories won with the old large-bore flint-lock musket familiarly known as "Brown Bess," which had an effective range of not more than 100 yards, and which, in spite of small improvements, continued to the last unhandy and awkward. The weapon by which it was superseded in our army was the well-known *Enfield* rifle, with which we won the day at the Alma and at Inkerman, and the comparative excellence of which contributed greatly to our success throughout the whole of the Crimean War.

In 1812, the Prussians had adopted the *needle-gun*, a breechloader on the bolt principle. The barrel was closed by a sliding plunger or bolt, which was pushed forward against the barrel, or withdrawn for the admission of the cartridge. In the former position it was secured by turning it, with the assistance of a small knob, a quarter circle to the right, on the principle of a common door-bolt. The

long steel needle, from which the gun derived its name, and by which the explosion of the charge was effected, worked in the hollow bolt, being driven forward by means of a spiral spring. The spring and needle were set, and the needle, so to speak, cocked by means of a trigger. The action of the trigger likewise released the needle, which was shot forward into a patch of detonating composition in the centre of the cartridge.

The ammunition consisted of an egg-shaped bullet, *a*, whose base was embedded in a *papier-maché* sabot, *b*. The fulminate was placed in the hinder part of the sabot; and behind this again, in a thin paper case, was the powder. It was a rough weapon compared with pieces of more recent introduction, but a great advance on anything known at the time. Its excessive weight, in fact, together with its many known defects, caused the sterling merit of the principle to be underrated, and it was not until 1864 that a committee of officers recommended the introduction of breechloading arms for adoption in the British army. The matter was being considered in a very leisurely manner when the Seven Weeks' War of 1866 took place. The entire military power of Austria was brought to a swift collapse by the superiority of Prussian needle-guns over



Needle-gun Projectile.

muzzle loaders, and the urgency of the case being so conclusively shown, all civilized powers hastened to re-arm their troops.

In England the Enfield rifles were converted into breech-loaders by the adoption of the *Snider* method, which consisted in cutting away two inches of the upper part of the breech end of the barrel, so as to admit the cartridge, which was pushed forward into a chamber formed by enlarging the end of the bore. A block, opening on a hinge, was then shut down to fill up the space behind, forming a false breech, against which the base of the cartridge abutted. The striker consisted of a needle passing through this breech-block; when struck from behind by the hammer it was driven against a cap in the base of the cartridge, exploding the charge. By this means the existing rifles were rapidly converted, and the army was provided with a breechloader of satisfactory efficiency should any emergency arise. The ammunition employed was invented by Colonel Boxer, superintendent of the Royal Laboratory, and had much to do with the success of the rifle.

The advantage of the Snider over the old musket consisted in the ability to fire four or five times more rapidly, or at the rate of 20 shots in one minute and a quarter; of its extended range, being more than ten times that of the musket, or 1200 yards; and of its greater accuracy and certainty in action. The entire army and volunteers were supplied with the Snider weapon, but the choice of it had been from the first provisional, and it was soon to be superseded by a superior arm.

In 1868 a commission, appointed to inquire into the best breechloading rifle to be finally adopted for the British army, sat for a long time at Woolwich. A number of gunmakers competed for a prize, which was ultimately awarded to Mr. Henry. Instead, however, of recommending his piece as a whole, the commission decided to take the best points in several rifles, and combine them in one, and the result was the official adoption, in 1871, of the Martini-Henry rifle. The credit given by the commission to the new arm—which is compounded of two elements, the Martini breech-action and the Henry barrel—was that it was superior to all competitors in point of endurance, ease of manipulation, rapidity of fire, accuracy of shooting, flatness of trajectory, initial velocity and penetration of bullet, and non-liability to fouling, as well as in economy

of cost. The bore of the barrel is of the small calibre of $\cdot 450$ inch; the system of rifling polygonal, with seven sides, the angles not being cleared out, but ribs or projections, which cut into the bullet, being left inside; the twist is 1 in 22, and is what is known as the increasing twist; weight, 8 lbs. 12 oz.; length, a little over 4 feet; and cost, less than £3.

The Martini breech is composed of only twenty-six separate parts, as against thirty-nine in the Snider, and the principle of its action is simple and direct. The breech-block is hollowed out on its upper surface, so as to permit the insertion of the cartridge into the chamber with ease. Its centre is likewise bored out, and contains within it the life of the machine—viz. a spiral spring coiled round a piece of metal, armed with a point, which protrudes beyond it, and passes through a hole in the front face of the block, exactly behind the percussion cap in the centre of the cartridge.

Immediately behind the trigger-guard there is a lever handle, and by the depression of the lever by the hand, the block is lowered, the exploded cartridge case ejected, and the mainspring compressed ready for firing. The cartridge having been inserted through a hollow in the upper part of the breech-block, the lever is at once brought up to its original position and held by a spring-catch. This motion elevates the breech-block and closes the breech. By the final motion of pulling the trigger the striker is propelled against the fulminating cap, and the firing is completed. The entire action is therefore comprised and completed in four simple motions—viz. (1) the depression of the hand-lever; (2) the insertion of the cartridge; (3) the elevation of the lever; and (4) the pulling of the trigger. In fig. 1, Plate II., *AA* is the neck; *BB*, the body; *CC*, the block; *D*, the block axis-pin; *E*, the striker; *F*, the main spring; *G*, the stop-nut; *H*, the extractor; *K*, the rod and fore-end holder screw; *L*, the ramrod; *M*, the stock, fore-end; *N*, the tumbler; *P*, the lever and tumbler axis-pin; *Q*, the trigger-plate and guard; *S*, the tumbler-rest; *R*, the trigger and rest axis-pin; *T*, the trigger and rest-spring; *V*, the stock-butt; *W*, the stock-bolt washer; *Z*, the lever catch bolt, spring, and pin.

An indicator is attached to the breech to show whether the mechanism is in firing position or not. This is necessary, because the breech block has the novel feature that the lock action and striker are all contained within it.

Although the Martini-Henry rifle was adopted in 1871, it was not at once supplied to the forces; its recoil was so strong as frequently even to disable the men who used it, and this objection was not fully overcome until 1875, when the War Office resolved to slightly reduce the weight of the cartridge. From 180 grains the bullet was reduced to 110 grains, the recoil being thus reduced about 20 per cent. The penetration at 500 yards is now about 11 inches of elm against 13 inches with the heavy bullet; and the accuracy of shooting is nearly the same with both ammunitions, the lighter having indeed a flatter trajectory at 500 yards than the heavier.

During the war of 1870-71, the rifle of the French the *Chassepot*—was a bolt gun, not unlike the needle-gun, but better both in barrel and breech-action; the bore was small, $\cdot 431$, the extreme range 1800 yards, and the weight of rifle and bayonet 11 lbs. It was very inaccurate, even at comparatively short ranges, but the most serious defect was that the cartridge was self-consuming—i.e. meant to be consumed by the powder, the result being an escape of gas at the breech, and an excessive fouling of the bore. After the war of 1870, this weapon was exchanged for the Gras rifle, an almost identical weapon, but with a metallic central-fire cartridge case. In our illustration fig. 3, Plate II., *A* is the bolt; *B*, the hammer; *C*, the mainspring; *D*, the striker or needle, and *E*, the extractor. The cartridge is also shown in section.

The Germans also, dissatisfied with the needle-gun, abandoned it for the 420 bore *Mausser*, a rifle with a bolt breech-action very like the needle-gun, but taking a metallic cartridge with the cap in the rear. In fig. 4, Plate II., A is the shoe of the breech; n, the trigger-spring; c, the breech-piece; F, the striker; G, the spiral-spring; K, the ejector; L, the lever; M, the movable-head; N, the safety-catch; Q, the screw; and S, the nut.

Although at the time of issue the Martini-Henry was the best military rifle in Europe, the very rapid improvement of the small arms of other nations caused the appointment, in 1881, of a committee to examine and report upon the question of a new rifle for the British army, with the strange injunction (from Mr. Childers) that the Martini breech-action was to be retained, although it was the only point on which the previous committee had any difference of opinion. With the sphere of their labours thus limited, one of the chief objects of the committee was to get an improved trajectory. The accuracy of the heavy Martini-Henry bullet was undoubted, and its weight retained the momentum and flattened the trajectory at long ranges as compared with the lighter bullets of other rifles, but this very cause introduced a curve in the trajectory at the important distances under 500 yards.

The result of the committee's report was the provisional adoption of the *Enfield Martini* as the new service arm. Its bore is 40 inch, the smallest of all the rifles adopted by the Great Powers, and the barrel is rifled in seven ratchet grooves, making one turn in 15 inches. The cartridge case is solid down, the powder 85 grains, the bullet 384 grains. The muzzle velocity is 1570 feet per second, and remains the highest of all military rifles at all ranges. At 200 yards the bullet will pass through a quarter-inch iron plate. The trajectory is remarkably flat, and may be roughly stated as 25 per cent. lower than those of its rivals, being nominally point blank at 100 yards, and with a curve of only 5 feet high in the first 350 yards.

At the breech it had a small sight for 100 yards, a leaf sight for 400, and an elevating back sight for 400 to 2000 yards, with a wind gauge attached to the slide. A wooden hand-guard was fitted to it so that the soldier's hand might be kept off the barrel when loaded with rapid firing, and it was proposed to adopt also a "quick-loader," a cartridge pouch which would contain six cartridges, and might be hung on to the side of the breech-action at will. But on the issue of a number of these rifles for experiment a new committee was appointed to report on them, with the result that most of the "improvements" in the stock, sight, and breech-action were condemned, and at the eighth year its manufacture was stopped, and the pattern of the new service rifle became once more an open question.

Although many thousands of the Enfield-Martini rifle were made it is probable that it will never be adopted as the service weapon, for the experimental rifles have been called in, and there is a growing feeling in favour of a magazine rifle. A rifle of this type has already been promised to the navy, and it would be unwise to spend millions on a new single-shot army rifle with the Martini breech, as it would be almost impossible to convert it into a repeater.

Magazine or Repeating Rifles have quite superseded Colt's old form of cylinder-revolving rifles. The first successful weapon was the Spencer, which was used during the American Civil War; the magazine consisted of a long string of cartridges passing, by the action of a spiral spring, from the butt to the breech, where an under lever successively forced them into the barrel and then withdrew the empty case after firing. Other repeaters, like the Henry and the Winchester, have the cartridges in a long magazine tube below the barrel. In the Schulhof repeater, the butt is a hollow case which is entirely filled with cartridges inserted through a lid in the side.

It now seems beyond doubt that the military small arm

of the future will be a magazine rifle, and that the next few years will see the Great Powers spending enormous sums in re-arming their soldiers. Each is at present carefully concealing the results of its experiments in this direction, lest a possible enemy may profit by the results of its experience. The power which is latest to adopt the new arm will probably have the most perfect weapon, but it risks as much as it gains, as it may be involved in a war before its new rifle is adopted and issued to its army. In 1887 France adopted the Kropatschek repeater for its marines, and issued experimental repeaters to its army; Germany adapted the Mannlicher repeating system to its Mauser rifles, ordered 1,000,000 stand of the new arm, and issued them rapidly to its troops; Italy transformed some of its Vetterli rifles into repeaters, and issued them experimentally to its army, while its marine service has already the Bertoldi repeater; Austria has converted its Wendt rifles into repeaters on the Mannlicher system; Russia has the Evans repeater in its navy, but seems unlikely to adopt a repeating rifle for its army; England is still engaged in private experiments, but the committee is said to have reduced the number of competing rifles to two, which are now undergoing a decisive trial.

The great range, extreme accuracy, and overwhelming rapidity of the fire of modern military rifles have completely changed modern tactics both in attack and defence. Breech-loading rifles have now rendered simply impossible the column attack formations which won Napoleon his long series of victories, and in civilized warfare the day is gone when, in broad daylight, a handful of determined men could drive a superior force out of a position with cold steel alone. Cavalry dare not now approach unbroken infantry, and their offensive operations are limited to an unexpected dash, followed, if unsuccessful, by an equally hasty retreat out of range. Artillery in many positions could not live within 800 yards of infantry, and to infantry itself one of the greatest obstacles is an open level space swept by the fire of the enemy's breechloaders. With the advent of the repeating rifle, it looks as if the pick and shovel would rank among one of the most useful parts of a soldier's equipment, so that he could at need hastily construct shelter for himself where the natural features of the ground afforded none.

BRITISH RIFLES, 1836-1887.

Name.	Weight.	Length.	Bore.	Range.	Powder.	Bullet.
	lb. oz.	ft. in.	in.	yds.	drs.	grs.
Baker,	8 9 3	93	705	—	—	—
Brunswick (1836), .	9 6 3	10	620	—	2 1/2	557
Minié (1851), . . .	9 18 4	7	703	1000	2 1/2	680
Enfield long (1853),	8 14 4	6 1/2	577	900	2 1/2	535
Enfield short (1860),	8 11 4	6 1/2	577	1200	2 1/2	585
Snider (1864), . . .	9 5 4	7 1/2	577	950	70	480
Martini-Henry (1871)	9 0 4	1	450	1300	85	480
Enfield-Martini, } proposed (1886) }	9 3 1/2	1 1/2	402	2000	85	384

Sporting small arms usually take the form of double-barrelled shot-guns, double-barrelled rifles for large game shooting, and small single-barrelled rifles for rooks, rabbits, &c. They are now all breechloaders, and there is a growing tendency to make them "hammerless," i.e. with the firing mechanism entirely concealed from view.

The prototype of the modern breechloading shot-gun is the Lefauchaux pattern. Its success was assured by

the ease of opening and closing the breech, and by the adoption of a cartridge which not only facilitated loading, but also prevented the escape of gas at the breech. Its appearance is well known. The barrels were hinged on a pin in rear of the centre of gravity, and were held horizontal by means of a catch which acted on a lump in rear of the hinge. To open the breech the catch was released by means of a lever, placed under the fore-end or under the trigger-guard, and then the muzzle fell down and raised the breech end of the barrels so that the loading was easily effected. The cartridges were *pin-fire*, i. e. within their base was a cap in which the lower end of a pin rested. The other end of this pin projected out of the upper side of the cartridge, and through a small hole in the barrel when the breech was closed. When the trigger was pulled the hammer fell on the projecting end of the pin which exploded the cap. This system was superseded by the modern *central-fire* cartridge, which has the head of the cap exposed to view in the centre of the base of the cartridge, the pin being a permanent part of the breech-action of the gun: this was a great step in advance, both for convenience and for safety, and it has been universally adopted for all guns, pistols, and rifles, both sporting and military.

Since the successful introduction of breechloading there have been two other great improvements in shot-guns,—the American mode of choke-boring and the adoption of the so-called hammerless mode of construction.

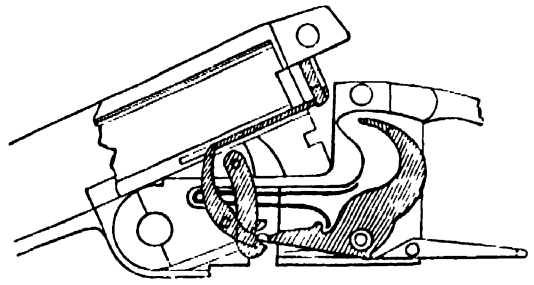
In *choke-boring* a gun the internal diameter of the muzzle is made less than that of the rest of the barrel. The amount of this constriction or "choke" varies from about 35-thousandths of an inch in a full choke to 5-thousandths in a modified choke, and this has been proved both to make the gun shoot more strongly than cylinder-bored guns, and also to prevent undue scattering of the pellets. To test the extent to which the pellets scatter, guns are fired at 40 yards range at a sheet of paper on which a 30-inch circle has been drawn; the result is said to be the "pattern" of the gun. A good cylinder-bore gun, with a load of $1\frac{1}{2}$ oz. No. 6 shot, can put about 140 into the circle, but choke-bores can easily be made to put over 200 pellets into the circle.

Hammerless guns are, of course, of more recent date than the invention of the percussion system. The Prussian needle-gun, invented in 1838 and adopted in 1842, may be named as the first well-known gun on this principle, and since then there has been a growing tendency to inclose the whole of the exploding mechanism within the stock. The term "hammerless" is really a misnomer, and the types of modern breechloaders are so numerous and varied that it is somewhat difficult to draw the line between what may be called a hammer or hammerless rifle. Those admirable weapons, the Soper and the Field rifles, have large and powerful hammers cocked by the thumb in the usual way, yet they are so buried in the centre of the stocks that little of them is visible, and at first sight the guns appear to be hammerless.

With shot-guns the line of demarcation is plainer, and guns with external hammers which are cocked by a special action of the thumb seem likely to soon become things of the past. Needham's (1856), Green's, Davies', and Murrcott's, were the first English guns of their kind; but the *Anson and Deeley* (1875) action was the first really popular hammerless system, and it still holds its own amid the crowd of rival and newer systems. The breech is opened by a top lever, and the barrels in falling cock the locks almost by their own weight. The mechanism is simple, easily manipulated, and perfectly safe. Of the other systems some cock the locks by the closing of the barrels, others by a special under or side lever, while in Purdey's gun one arm of the mainspring cocks the lock and then the other fires it.

Ejector guns throw out the empty cartridge cases when

the breech is opened. Perhaps the most ingenious of this class is Greener's, in which the mainspring is contrived to do this as well as to fire the gun.



Greener's Ejector.

Express rifles are used for ordinary large game, and may be looked upon as the highest development of small arms. They have slow shallow grooves, a large charge of powder, and a light bullet with a cylindrical hollow extending nearly the whole extent of its longer axis. The result is a very high velocity and low trajectory, practically point blank to nearly 200 yards, and the bullet, from its peculiar form, expands in passing through the object and causes an enormous wound.

SMALL DEBT COURT. See COUNTY COURT.

SMALL-POX (*Varola*), a contagious fever, characterized by a pustular eruption having a depressed centre. The name *variola* is derived from the Latin *varus*, a blotch or pimple, while *pox* is of Saxon origin, and signifies a bag or pouch, the prefix *small* being added in the fifteenth century. When or how it arose is not known, but it was known in Europe in the sixth century, into which it seems to have come from Arabia, and where it was afterwards spread by the followers of Mohammed. It is first mentioned by Rhazes, an Arabian physician, who flourished at Bagdad in the beginning of the tenth century; but he quotes several of his predecessors, one of whom is believed to have been living at the time of the Hejira, A.D. 622. It is now found in all civilized and in many of the uncivilized countries of the world, no climate being free from its ravages, and it affects all races, every age, and both sexes. It is exceptionally severe among negroes and the inhabitants of warm climates, and it rages with special virulence where it appears for the first time, sometimes carrying off whole tribes. As a rule it attacks the same person once only, but to this rule there are some exceptions; while there are also persons who appear to be insusceptible to this disease, and who are quite incapable of being infected by it. There is no reason to believe that it ever arises spontaneously, but its spread is believed to be wholly due to contagion and inoculation. In the ordinary way, after the poison has been received into the system, a period of incubation follows of from twelve to fourteen days, and then the disease is ushered in by fits of shivering, pains in the back and loins, prostration of strength, loss of appetite, nausea, and sometimes vomiting, and in young children frequently convulsions. About forty-eight hours after the commencement of these symptoms an eruption of small, hard, red-coloured pimples makes its appearance about the face and neck, and gradually extends downward over the trunk and extremities. On the fifth day the eruption is usually complete, and after this few or no new spots appear. The primary fever, as it is called, now lessens; but the pimples increase in size, and become converted into whey-coloured pustules, with a depression in their centre. About the eighth day of the eruption a dark spot makes its appearance at the centre of the pustules, and about the eleventh the matter oozes from them and concretes into crusts, which fall off about the four-

teenth day, leaving the skin of a brownish-red colour, and studded with slight depressions or pits. In passing away the eruption follows the course which it took on its first appearance, the crusts falling first from the face, then from the trunk, and lastly from the extremities. When the pustules are comparatively few, they are separated sometimes widely from each other, and the disease is then termed *discrete* (*Variola discreta*); when they are very numerous, they touch each other and run together, and then it is termed *confluent* (*Variola conflens*). Other forms of the disease are those known as the *hemorrhagic-pustular* and the *malignant* or black small-pox, the first of which is almost invariably and the latter invariably fatal. In the discrete form the fever commonly subsides on the appearance of the eruption, and when the pustules are few it may not return; but when they are at all numerous, their maturation is commonly attended with more or less fever. With the appearance of the eruption on the surface, more or less sore-throat is complained of; the tongue and tonsils are red and swollen, and pustules make their appearance upon them, upon the roof of the mouth, and the inside of the cheeks; the patient at the same time is commonly troubled with salivation. When small-pox is confluent, the subcutaneous cellular tissue seems involved in the disease, the swelling of the face is very great, and the fifth day the patient is commonly unable to open his eyes. The eruption is attended with a tormenting itching, and the fever is of the typhoid kind, the debility being extreme, and the patient restless, sleepless, and often delirious, while the pulse is small, frequent, and feeble. In such cases the accompanying inflammation of the mouth, nasal passages, pharynx, and larynx, adds greatly to the distress of the patient and the danger of the disease, sometimes even producing suffocation. The disease is always attended by a peculiar odour, but in confluent cases this is nauseous and offensive to an excessive degree. In this form the fever, which commonly abates on the coming out of the eruption, is aggravated as the eruption approaches maturation. In confluent cases the temperature and general symptoms reach their height about the eighth day of the eruption or the eleventh day of the disease, and in unfavourable cases death usually occurs about the eleventh day, the signs of a fatal termination being low delirium, variable temperature, starting or twitching of the muscles and limbs, involuntary motions, and occasionally hemorrhage into the skin. In favourable cases the eleventh day generally marks the turn of the disease, and by the fourteenth day convalescence will have begun. The crusts formed, however, are often retained many weeks, and when they fall off they leave pits of a reddish-brown colour, which in process of time become white.

Small-pox is, upon the whole, attended with considerable mortality, and statistics show that while the discrete form is rarely fatal to adults, half of the confluent cases are followed by death, all the malignant are fatal, and nearly all children under one year who take the disease die, whatever form it may assume. As regards the influence of vaccination, it may be observed that the most recent calculations show that the unvaccinated generally die at the rate of about 50 per cent., the imperfectly vaccinated at the rate of 26 per cent., and the well vaccinated at the rate of about 23 per cent. This part of the subject, however, will be more fully considered under VACCINATION. Of the complications of small-pox, laryngitis, bronchitis, and pneumonia are the most common, and the later stages of the disease are occasionally marked by an intercurrent inflammation of the conjunctiva, which may result in the blindness of one or both eyes, and before the introduction of vaccination blindness from small-pox was common. Besides inflammation of the eyes, glandular swellings and abscesses, bed-sores and phlebitis are occasional complications, and where it occurs during pregnancy it

frequently causes premature delivery and the death of the child, though the mother often recovers without injury. Like many other contagious diseases, it is subject to epidemic influence, and when it prevails epidemically it seems to be severer and more fatal.

With respect to the treatment of small-pox, no specific is known for it, and mild cases are best left to run their course without interference. The patient should be kept in a large well-ventilated room. He should be fed at intervals on easily digestible food, such as milk, beef-tea, chicken broth, and eggs beaten up, and he may be allowed to drink freely of iced water or iced lemonade. Heat of the skin may be relieved by cold water sponging, and the swelling of the eyelids and other painful parts may be checked by the constant application of cold compresses. The irritation of the sores may be relieved by the application of olive oil, cold cream, or vaseline, and some harmless disinfectant and deodorant, such as sanitas powder, may be sprinkled over the bed-clothes and about the room. The complications of the disease must be treated upon general principles. As the disease is *extremely* contagious every care should be taken to prevent the infection of others, and the patient must not mingle with other people until the crusts and scales have disappeared and at least six baths have been taken at intervals of two days.

SMALT (from Old English *smelt*; that is the German *schmelzen*, to fuse), a sort of soft glass of potash and silica coloured blue by cobalt ores, and used in a finely ground state for ornamenting porcelain and other wares, staining glass, painting in enamel, &c., as it is not affected by fire. It is also used as a (very inferior) pigment in painting, and largely serves as colouring matter for blue paper, &c. Chemically, it is a potassio-cobaltous silicate, having the approximate formula $(K_2OCo_2O)6SiO_2$.

SMART, SIR GEORGE THOMAS, a musical composer, but better known as a conductor of great eminence, was the son of a music-seller. He was born in London in 1776, and died there in 1867. He played under Haydn in Salomon's concerts in 1791, and attracted the notice of the composer. He received knighthood in 1811 for conducting a very successful series of concerts in Dublin. In 1813 he was elected one of the original members of the Philharmonic Society, and conducted no less than forty-nine of its concerts between that date and 1811. He was the recognized head of music in England in his day. Weber stayed with him in 1826 when he came over with "Oberon," and indeed he died at his house. It was Sir George who introduced Mendelssohn to England, with "St. Paul," in 1836. At the same time he was the great authority for the music of Handel, which his father had heard conducted by the composer, and had described minutely to Smart as a youth. He conducted and organized a large number of festivals and musical societies, and was still hard at work when he died, a little over ninety.

His brother Henry was also a good musician, and the son of this Henry (also Henry Smart) was the elegant composer of our own day. Henry Smart the younger was born in 1818, and died in 1879. He was an excellent organ-player, and some of his best work is written for this favourite instrument. His finest production is undoubtedly the favourite cantata "The Bride of Dunkerron" (Birmingham Festival, 1861), a work of decided power and originality. Opera and oratorio, though he tried both, were beyond his power; but in the part-song he was among the most successful and admired writers of his time. He became blind in 1864, but, like Professor Macfarren, his contemporary, his misfortune was not allowed to interfere with diligent work at composition.

SMEAR DAB (*Pleuronectes microcephalus*) is a British species of **FLAT-FISH** (*Pleuronectidae*). It is a northern form, taken chiefly on the north coasts of Scotland, and ranging to Scandinavia and Iceland. It some-

times attains a length of 17 inches. It is oval in shape, rather thick, covered with small scales, with a small head; the lateral line is only slightly curved above the pectoral fins. The upper surface of the body is brownish, with darker marblings. The smear dab is usually taken in a trawl, as it does not readily take the hook. The flesh is valued. It spawns in May or June. It is also called the Lemon Dab or Smooth Dab.

SMEATON, JOHN, an eminent English civil engineer, was born 8th June, 1724, at Austhorpe, near Leeds. He was brought up with a view to the legal profession, but mechanical pursuits engrossed his attention from a very early age. About 1742 he removed to London, and, abandoning the law after a short trial, is next found, about 1750, pursuing the business of a mathematical-instrument maker in Great Turnstile, Holborn. In 1751 he constructed a machine for measuring a ship's way at sea. In 1753 he became a member of the Royal Society, and had contributed to the *Transactions* even before that date. He made some valuable improvements in hydraulic machinery, and for his paper on the subject, read before the Royal Society in 1759, he was awarded the Copley gold medal. In 1766 Smeaton commenced the great work which may be regarded as the chief monument of his skill—the Eddystone Lighthouse. See EDDYSTONE.

Of the many useful works which he executed Ramsgate Harbour perhaps holds, next to Eddystone Lighthouse, the most prominent place. This work was commenced in 1719, and placed under his superintendence in 1774; but was completed by the two Rennies, father and son. Smeaton laid out the line of the great canal (the Forth and Clyde) connecting the western and eastern shores of Scotland, and superintended the execution of great part of it. The Spinn Lighthouse, at the mouth of the Humber, some important bridges in Scotland, and many other works of like character were executed by him. He was engaged in the construction of the harbours of Bristol, Christchurch, Dover, Lynn, Rye, Scarborough, Sunderland, Whitehaven, Workington, and Yarmouth. He died at Austhorpe, 28th October, 1792. See Smiles's "Lives of the Engineers" (1875).

SMELL. The essential part of the organ of smell consists of the expansion of the olfactory nerves, the first or most anterior of the nerves from the brain, whose minutest branches are distributed just beneath the mucous membrane of part of the nose.

The human organ of smell is less developed than that of other Mammalia, in most of which the turbinated bones and all the parts to which the olfactory nerves are distributed, are much larger and more complicated in their form.

All that is necessary for the perception of an odour is that the scented particles (without undergoing any such changes as light does in arriving at the retina, or sound on its way to the auditory nerve) should come in contact with the surface under which the olfactory nerves lie, with the force of rather more than an ordinary inspiration. If the medium containing the odour be at rest, or be only gently forced against the membrane, no impression is produced.

In different animals the sense of smell is adapted chiefly to that class of substances on which they feed. The Carnivora, for example, have an acute sense of the odour of animal substances, but, so far as we can discern, none for that of vegetables; and, on the other hand, Herbivora are as clear in their perception of the latter, and as nearly insensible to the former. Man, as his food is mixed, so also is his sense of smell adapted to both classes of substances, though for each less acute than that of the animals that feed exclusively on the one or the other. In the choice of food, which is the main object of the sense of smell, man generally (though almost unconsciously), and animals always, exercise the precaution of smelling, and they instinctively form a judgment according to the impression

received. In eating, also, much of that which is commonly attributed to the sense of taste depends on the odour of the food carried from the mouth to the nose. In eating cinnamon, for example, or any similar aromatic substance, if we close the nostrils we perceive no flavour, and, except the stinging of the tongue, might imagine ourselves eating a tasteless wood. And, in like manner, we often mistake for those of odour the impressions made by substances on the nerves of common sensation with which the lining membrane of the nose is abundantly supplied; for example, in smelling ammonia, vinegar, and other acid substances, the impression which we regard as their odour is compounded of that and of the irritation of the nerves of common sensation; and the nose of an animal whose olfactory nerves are destroyed is hardly less sensible to this latter irritation than that of one in which the nerves are entire. Facts of this kind have led to the error of supposing that the olfactory are not the only nerves of smell; they only prove that the sense of smell has a more limited range than is commonly supposed. The same substances, ammonia and the like, which irritate the common sensitive nerves of the nose, act in the same manner on the eye or on any equally delicate part; but in the nose alone is this irritation accompanied by any peculiar sensation of odour by which one such substance can be distinguished from another. This perception of odour, independently of irritation, is the proper function of the olfactory nerves, which are thus strictly nerves of peculiar sensation, of the same class with the optic, auditory, and gustatory.

The associations raised by familiar odours are often very keen. An instance is on record of a lawyer whose delight was to get within range of a farmyard, because his childhood had been spent amid sights, sounds, and scents that surround the farmhouse, and the familiar ammoniacal exhalations carried him back to the green fields and rustic pleasures of his youthful home. Another individual is known whom the noisome smell of sulphuretted hydrogen gratified and pleased. His explanation was that many of his happiest days were spent as a student in a well-known chemical laboratory, where certainly that smell prevailed to an unusual extent. A kindred smell, namely, that of rotten eggs, is highly appreciated by the Chinese; but this, of course, is rather a cultivated preference than one due to association. Similarly, asafoetida and valerian are the delight of many Eastern nations. And every one knows that Schiller could not compose except rotten apples filled the drawer of his writing table.

Many instances are mentioned by different authorities of persons being rendered faint, or otherwise painfully affected, by such odours as musk, civet, and even in some cases by the more generally agreeable one of the rose. Often, however, this effect is due more to imagination than to anything else; for example, Dr. Carpellì tells us of a lady who could not bear the smell of the rose, and actually fainted on receiving a visit from a friend who carried one; and yet the flower, the cause of all the trouble, was an artificial one, and quite innocent of scent.

Many uncivilized tribes, compelled by their lack of other resources to cultivate to perfection the animal senses, are able to smell as keenly as the bloodhound, and can track their objects of search for miles, aided only by the marvellous delicacy of their olfactory nerves. Blind persons also often experience this extraordinary exaltation of the sense of smell.

SMELT (*Osmerus*) is a genus of fishes belonging to the family SALMONIDÆ. The body is covered with small, oval, deciduous scales. The dentition is well developed. There is a transverse row of vomerine teeth, several of which are large and fang-like, and a row of conical teeth along the palatine and pterygoid bones; the tongue has strong teeth anteriorly, and several longitudinal rows of small teeth behind. The Common Smelt (*Osmerus eper-*

lanus) is common on the coasts of Northern Europe, ascending rivers and lakes; it has become fully acclimatized in fresh waters, being found in lakes that have no communication with the sea. It ascends rivers about August, making its way down to the sea again in May. It is taken plentifully in the rivers of England and Scotland, and also in estuaries and sandy coasts near the shore. It is not known on the south coast of England. The smelt is usually about 7 inches long, but sometimes grows to a length of 12 or 13 inches. The back is of a transparent greenish tinge, and the sides and belly are silvery. In appearance the smelt resembles the trout, but is rather more slender, and has a proportionately larger and more forked tail. The lower jaw is longer than the upper. The smelt is highly esteemed for the table, having a very delicate flavour and a peculiar cucumber-like odour. In North America is a closely allied species, *Osmerus viridescens*, which by some is regarded as not specifically distinct.

SMERDIS, the son of Cyrus, was murdered by order of his brother Cambyses. Years afterwards the Magi, heading a revolt against Cambyses in his absence, produced a man much like the king's family, whom they declared to be Smerdis, preserved by them instead of killed, according to the king's order. Cambyses died in Syria, and the false Smerdis reigned for seven months over Persia. He was then discovered to be an impostor who had lost his ears as a common felon, and the Persian nobles forced their way to him and killed him, electing as his successor the famous Darius, son of Hystaspes.

SMEW (*Mergus albellus*) is a species of Merganser (Mergine), a subfamily of ducks. It is a native of Northern Europe and Asia, ranging into India in the winter. Its occurrence in North America is accidental. The smew visits British coasts in winter, especially in severe weather, and occasionally travels inland. The male bird is about 18 inches and the female 14 inches in length. The male bird in the breeding season is white, with black crescentic markings. It agrees in its habits with the other mergahsers.

SMILAX is a genus of plants belonging to the tribe Smilacæ, of the order LILIACEÆ. The species form evergreen climbing shrubs, of which a few are found in temperate, but the majority in warm and tropical regions of both hemispheres, extending south to Australia and north to Japan, North America, and the south of Europe. The stems are usually prickly, with net-veined leaves, furnished with a tendril on each side of the petiole. The flowers are in globular heads, sessile or stalked in the axils of the leaves; they are dioecious or hermaphrodite, with a six-parted spreading greenish or yellowish perianth, six stamens, and a free three-celled ovary. The fruit is a small berry, with one to three seeds. Some of the American species furnish the drug SARAPARILLA.

Smilax aspera, a native of the south of Europe, yields Italian saraparilla, and still continues to be employed for medicinal purposes. *Smilax China* has a tuberous root-stock, which is eaten by the Chinese, and also yields a yellow and brown dye. It was introduced about 1535 as a remedy for gout and rheumatism, but has now fallen into disuse. The tuberous root-stocks of *Smilax pseudo-China*, a native of the Southern United States, where it is known as the China brier, abound in starch, and have been used as food by the Indians in times of scarcity; a kind of beer is also made from them. The young shoots are eaten as asparagus. Several other species are used medicinally. *Smilax rotundifolia*, the green-brier of the United States, is a handsome climbing plant.

SMITH, ADAM, a distinguished political economist, was born at Kirkcaldy, 5th June, 1723. He was sent to the grammar-school of his native town, and from 1787 to 1799 he pursued his studies at the University of Glasgow. Being designed for the Church of England, he left Glasgow

and proceeded as an exhibitor on Snell's foundation to Balliol College, Oxford, where he spent seven years, and where mathematics and natural philosophy, with ancient and modern languages, were his favourite studies. Having abandoned the idea of taking orders, he returned to Scotland, and in 1748 went to reside at Edinburgh, where, for the next three years, he read lectures on rhetoric and belles-lettres. In 1751 he was elected professor of logic in the University of Glasgow, and in the following year was appointed to the chair of moral philosophy, which he filled for nearly thirteen years. The third division of his lectures included various subjects, which he subsequently treated so ably in the "Wealth of Nations." During his residence in Glasgow he published his "Theory of Moral Sentiments;" the first edition appeared in 1759, and the sixth, which contains considerable additions, shortly before the author's death. To the second edition was prefixed a dissertation on the origin of languages, afterwards published separately. In 1763 Smith resigned his professorship in consequence of an invitation to accompany the young Duke of Buccleuch on his travels. He left London with his noble pupil January, 1764, visited various parts of France and Switzerland, and returned to England after an absence of three years. At Paris he made the acquaintance of some of the most renowned wits and savants of the age. Smith soon after proceeded to Kirkcaldy, where, with the exception of occasional visits to Edinburgh and London, he resided until 1776, engaged in his great work, the "Wealth of Nations," which appeared early in that year. The two following years were spent in London. In 1788 Smith was appointed one of the commissioners of customs for Scotland, on which he removed to Edinburgh, and there took up his residence for the remainder of his life. In 1763 he had received the degree of LL.D. from the University of Glasgow, and in 1787 was elected its rector. Smith was never married, and died in July, 1790. The best edition of his works is that edited by Thorold Rogers in 1870.

The "Wealth of Nations," or, to give the title correctly, the "Inquiry into the Nature and Causes of the Wealth of Nations," is the work on which the fame of Adam Smith will permanently rest. It was a most useful work at the time; and if it has been to some extent superseded by the writings of later political economists, they have been indebted to it for the first principles of the science which they have placed on a more extended basis. For a further notice of its influence see under POLITICAL ECONOMY.

SMITH, ALBERT RICHARD, the son of a respectable surgeon, was born at Chertsey, in Surrey, 24th May, 1816. Embracing the medical profession, he received his diploma from the Royal College of Surgeons in 1838, and for a short period assisted his father in his professional duties. In 1841 he commenced his connection with *Punch*, to which he supplied various serial papers. He also furnished the London theatres with many highly popular comedies, farces, burlesques, and extravaganzas. His more serious efforts were the novels of "The Adventures of Mr. Ledbury," "The Scattergood Family," "Christopher Tadpole," and "The Pottleton Legacy." In 1847 he made a tour to the East, and on his return published his "Month at Constantinople." He also embodied the result of his observations in a monologue entertainment, accompanied by finely painted scenery, entitled "The Overland Route." Its success was great, but not to be compared with that of "An Ascent of Mont Blanc," which he commenced in 1852. A visit to China in 1858 furnished the materials of a third entertainment, which was received with equal favour. He died on the 23rd of May, 1860.

SMITH, ALEXANDER, one of the best of the minor poets of our time, was born at Kilmarnock, Ayrshire, on the last day of the year 1830. He began life as

a pattern designer in a Glasgow warehouse, but soon took to verse-making, and his very first volume of poems raised him to fame (1853). He was at once appointed secretary to the University of Edinburgh, and was able to give free rein to the development of his genius. All his work is marked by originality and richness of imagery, and by great refinement and polish of style. He died in 1867, greatly regretted.

SMITH, FATHER, the name generally given to Bernhardt Schmidt (1630-1708), who came over from Germany with his nephews, Gerhardt and Bernhardt Schmidt, as his assistants, to build anew, in the times of the Restoration, the church organs destroyed by the Puritans and the Commonwealth. The first one was the Chapel Royal organ, as Pepys records, in 1660. The king gave Smith apartments in Whitehall wherein to work at organ-building. In 1682 occurred the famous competition with Renatus Harris for the Temple organ, in which Smith conquered, and erected the noble instrument well known to musicians. A large number of the old city organs were by Father Smith and his nephews, but most have now disappeared. The old Durham organ and the old Westminster Abbey and St. Paul's organs were all by him.

SMITH, GEORGE, an eminent English Assyriologist, was born at Chelsea, 26th March, 1840. His imagination was fired in early life by the story of the buried cities of Assyria, and in 1857 he commenced the study of Accadian. On the recommendation of Sir Henry Rawlinson he was, in 1865, appointed keeper of antiquities at the British Museum, and the following year he was fortunate enough to discover among the paper casts preserved in the museum an inscription of Shalmaneser II., giving an account of the war against Hazael. He assisted Sir Henry Rawlinson in the preparation of his third volume of "Cuneiform Inscriptions of Western Asia," and continuing his explorations among the treasures of the museum he brought to light, among other matters, a tablet noticing the eclipse of 15th June, 763 B.C.; notices of the Israelitish kings Azariah, Pekah, and Hoshea; accounts of the conquest of Babylonia by the Elamites in 2280 B.C.; and a tablet containing a Chaldean account of the deluge. In 1871 he published, at the cost of Mr. Fox Talbot and Mr. J. W. Bosanquet, his great work on the history of Assurbanipal, in which 3000 lines of inscriptions in the British Museum relating to that monarch are transcribed, transliterated, and translated. In 1873 he went on an exploring expedition to Nineveh, at the cost of the proprietors of the *Daily Telegraph*, and in 1874 he went thither again on behalf of the British Museum. His labours were cut short by the expiry of his *firman*, which the Turkish authorities refused to renew; but though he had only been able to devote four months to actual work, he succeeded in fixing the date of the south-east palace at Nimrud, in discovering a large number of valuable relics, and in securing nearly 3000 additional tablets covered with inscriptions, which were subsequently described in his "Assyrian Discoveries" (1875). In March, 1876, he started once more for the East, and after making some interesting archaeological discoveries he was overtaken by disease, and died at Aleppo, 19th August, 1876. In 1877 his posthumous "Ancient History of Babylonia from the Monuments" was published by Mr. A. H. Sayce, and the same editor issued in 1878 another posthumous work entitled the "History of Sennacherib."

SMITH, JAMES and **HORACE**, the joint authors of the "Rejected Addresses," were born in London; James on 10th February, 1775; Horace on 31st December, 1779. They were the sons of an attorney in good practice, who became solicitor to the Board of Ordnance. Their literary tendencies were manifested at an early age, and were discouraged by their father, though he was himself a man of accomplished mind and elegant tastes. James went

into his father's office, and succeeded him in his solicitorship, discharging its duties with talent and assiduity. Horace became a stockbroker, and earned an abundant competency, which he was always happy to share with the distressed and deserving. To the poet Shelley he was a warm and munificent friend, and the poet has left on record a grateful appreciation of his estimable qualities.

Both brothers, of whom it is pleasant to record that they always lived on the most affectionate terms of confidence and sympathy, contributed, while young, to periodicals, and in 1807 Horace even published a novel, "Horatio;" but they did not attain any degree of fame till 1812, when they gave to the world the "Rejected Addresses," eleven admirable parodies or imitations, in verse and prose, of the principal authors of the time. The managing committee of Drury Lane Theatre had offered a premium for the best address to be spoken on the occasion of the re-opening of the theatre in 1812, after its destruction by fire in 1809. None of the competitive pieces were deemed of sufficient merit, and the address finally spoken was written by Lord Byron. This incident suggested to the brothers the composition of their felicitous parodies, under the guise of addresses supposed to have been rejected by the committee. The book was at first rejected by Murray, the publisher, but after it had run through sixteen editions he purchased the copyright in 1819 for £131.

The success of the work was immense, and so far satisfied James Smith that he never attempted anything of an ambitious character afterwards, but lavished his rare humour on fugitive papers, and on some of the happiest "At Homes" of the elder Charles Matthews (1820-21). His conversational powers were very great, and he continued to attract around him the *élite* of London society until his death in December, 1839. His "Memoirs, Letters, and Comic Miscellanies, in prose and verse," were published in the following year under his brother's editorship.

Horace Smith in 1826 made his first appearance as a writer of historical novels, and his "Brambletye House" immediately secured the public favour by its interesting plot and able descriptions. It was followed by several other novels, some historical and some dealing with contemporary manners—"Tor Hill," "Zillah, a tale of the Holy City," "The Midsummer Medley," "Walter Ceylon," "The Involuntary Prophet," "Jane Lomax," "The Merchant," "Adam Brown," and the "Moneyed Man," all long since forgotten. He also contributed numerous papers in prose and verse to the leading magazines. He died on 12th July, 1849, aged seventy.

SMITH, SIR JAMES EDWARD, M.D., the founder of the Linnean Society and the greatest British botanist of his time, was born at Norwich, in December, 1759, and died in his native city on 17th March, 1828. He studied medicine in Edinburgh, where his great botanical taste seems to have been fostered and matured under the tuition of Dr. Hope, the professor of botany; but he does not appear to have followed medicine as a profession until his later years, which he spent in Norwich, although in 1786 he graduated as M.D. at the University of Leyden. He was an unwearied writer upon his favourite topics, and during the long period extending from 1786 down to 1824 was continually contributing to botanical and geographical literature. He was the founder of the Linnean Society, was its first president, and retained that honourable office for the period of forty years. Soon after the death of Linnæus he purchased the extensive collections and library of that prince of naturalists, and at his own death in turn the Linnean Society acquired these treasures. In 1814 his scientific eminence was acknowledged by the honour of knighthood, which he received from the hands of the prince regent during the illness of George III.

SMITH, JOHN STAFFORD, one of the very finest glee-writers England has produced, was the son of the organist of Gloucester Cathedral, and was born in that city in 1750. He died in London 1836. As a lad he came up to London to the Chapel Royal, and studied under Boyce and Nares. In 1773 he gained his first prize at the Catch Club, and frequently gained prizes afterwards. He became later in life a lay vicar of Westminster Abbey, organist of the Chapel Royal, and master of the children. Besides writing his beautiful anthems and glees, Smith studied the antiquities of music so thoroughly as to become in some departments the chief authority of his day. He was of great assistance to Sir John Hawkins in his "History of Music." In 1812 he produced his interesting work, "*Musica Antiqua*," a collection of music from the twelfth century onwards. He was a most industrious writer, composing far more than was published; but most unhappily, owing to the insanity which overtook his widow, all his valuable library and his unpublished compositions were sold by incompetent persons, and have never been traced since.

SMITH, SYDNEY, a distinguished clergyman of the Church of England, was born on 3rd June, 1768, at the village of Woodford, in Essex. He was educated at the collegiate school of Winchester, was entered in 1780 a scholar of New College, Oxford, and elected a fellow in 1790. In 1796 he took the degree of M.A., and soon afterwards obtained the curacy of Nether-Avon, near Amesbury, in Wiltshire, where he remained about two years, and then accepted the office of tutor to the son of Mr. Hicks-Bach, M.P. for Cirencester. Sydney Smith went with his pupil to Edinburgh, where he remained about five years. Among the persons with whom he formed an acquaintance in that city were Henry Brougham, afterwards Lord Brougham, Lord Jeffrey, and others of similar opinions in politics. This acquaintance led to the establishment of the *Edinburgh Review*, of the first number of which (published in October, 1802) Sydney Smith was the editor. In 1803 he removed to London, where he became preacher at the chapel of the Foundling Hospital and at other places. He also delivered lectures on polite literature at the Royal Institution in Albemarle Street, which, however, were not published until 1850; and he was a regular contributor to the *Edinburgh Review*.

Lord Erskine, when lord chancellor, gave him, in 1806, the rectory of Foston, in Yorkshire. In 1829 he was presented to the rectory of Combe-Florey, in Somersetshire, by Lord Lyndhurst, and in 1831 was appointed by Earl Grey one of the canonical residentiary of St. Paul's Cathedral. Except for a few years, when he resided at his rectory at Foston, and during which he published anonymously, in 1808, in support of the cause of Catholic Emancipation, his ironical and witty "Letters on the Subject of the Catholics to my Brother Abraham who lives in the Country, by Peter Plymley" his place of residence was in London, where he associated with literary men and politicians of Whig principles. He was distinguished for his conversational powers, and was a frequent dinner-out. He died at his house in Green Street, Mayfair, London, on 22nd February, 1845.

Sydney Smith published "Six Sermons" (Edinburgh, 12mo, 1800); "Sermons" (two vols., 8vo, London, 1809); several occasional sermons and political pamphlets, and contributions to the *Edinburgh Review*. In 1839 he published those which he regarded as the best of his compositions in "The Works of the Rev. Sydney Smith" (three vols., 8vo), with a preface and portrait.

Sydney Smith was a very effective writer; he had considerable argumentative power, united with a ready wit, a copious, original, and unctuous humour, and poignant satire. His style was clear and forcible, without any apparent aim at elaboration or polish. His life and letters

were published in 1855 by his daughter, Lady Holland, and give the reader a favourable idea of his amiability of disposition and sterling excellence of character.

SMITH, WILLIAM, was born 23rd March, 1769, at Churchill, in Oxfordshire. He has been called the "father of English geology," a science which his employment as surveyor of collieries and mines in Somersetshire, and as engineer to the Somerset Coal Canal, gave him ample opportunities of investigating.

With his ideas upon the subject clearly established, Mr. Smith, in 1794, was enabled, by one long journey through a great part of England and Wales, to commence a "Geological Map of England and Wales," and a "Table of Superposition of the Strata." This table was drawn up in 1799; a map on a small scale was coloured in 1801; and the author promised in that year a valuable volume to accompany documents so new and important. It would be painful to speak of the discouragements and difficulties which he had to overcome before, in 1815, on a large and handsome scale, appeared the "Delineation of the Strata of England and Wales," with an interesting memoir. To his favourite science all the profits of a successful profession were devoted, but not even when suffering from the consequences was he ever known to regret the sacrifices he had made.

After giving to the world twenty-one geologically-coloured maps of English counties, many valuable sections, and two unfinished volumes on organic remains, Mr. Smith was for many years lost to science till drawn from his retirement by the Geological Society of London, which, in 1831, awarded to him the first medal placed at their disposal by the bequest of Wollaston. In 1835 he received the degree of LL.D. in Trinity College, Dublin, and for a few years enjoyed a pension of £100. He died on 28th August, 1839.

SMITH, SIR WILLIAM SIDNEY, an illustrious English admiral, was born at Midgham, Sussex, in 1761. He entered the navy at the age of twelve, and before he was twenty he was post captain, serving to the close of the American War. He subsequently participated in the war between Sweden and Russia, as a captain in the Swedish service; and on the breaking out of the war between England and France, he returned to the English service, and in command of a small flotilla was detailed to harass the French commerce in the channel. In April, 1796, he was captured while trying to cut out a ship at Havre, and was confined for two years in the prison of the Temple in Paris. The French government refused to exchange him, but he ultimately escaped by the aid of a French officer, and in 1798 he sailed in command of a squadron to operate against the French on the coast of Egypt. He conducted successfully the memorable defence of St. Jean d'Acre against Bonaparte, and he subsequently signed a treaty with General Kléber for the evacuation of Egypt by the French; but the British government refused to ratify the treaty, and he continued to participate in the war until compelled by wounds to return to England in 1801. He afterwards returned to service, was raised to the rank of rear-admiral of the Blue in 1805, was promoted to the rank of vice-admiral in 1810, and at the close of the war he received a pension of £1000. In 1821 he was made an admiral. He spent the closing years of his life chiefly at Paris, and died there 26th May, 1840.

SMITHSONITE. See **HEMIMORPHITE**.

SMOLENSK, one of the oldest towns of Russia, the chief town of a government of the same name, on the Dnieper, which is here crossed by a bridge. It is 250 miles W.S.W. of Moscow, in an important military position, is considered the key to the interior of Russia, and is fortified. In 1812 the first serious conflict between the French and the Russians took place on the 16th and 17th of August under the walls of

Smolensk, when the town was bombarded and half of it burned before it surrendered to the French. On their retreat in November following, they blew up part of the works. Since that time the city has been almost entirely rebuilt on a regular plan. Most of the houses are of stone, and many of them handsome. The public buildings are numerous; there are cathedrals and Greek churches, several monasteries, one Roman Catholic and one Lutheran chapel, a gymnasium, a seminary for priests, a military school, &c. An iron pyramid commemorates the resistance made to the French in 1812. The manufactures are linen, carpets, leather, silk, hats, and soap. There is a considerable export trade in corn and flax. The population of the city in 1882 was 35,830.

SMOLLETT, TOBIAS GEORGE, the great novelist, was born at Dalquhurn, a quiet farmstead in the beautiful valley of Leven, Dumbartonshire, in 1721. His father was Archibald, son of Sir James Smollett, a Scotch judge, and one of the commissioners who negotiated the Union. Smollett received his education at the grammar school of Dumbarton and the University of Glasgow, where he distinguished himself by his industry and talent.

After studying with a surgeon, and then attempting (and failing in) a literary career in London, Smollett was glad to take a berth as surgeon's mate on board a man-of-war. He served in the disastrous Carthage expedition. There were no "special correspondents" in those days, and incapacity and cowardice got off scot free; but in "Roderick Random" Smollett has done something towards the exposure of the mismanagement of the "good old times."

He quitted the service and remained two or three years in the West Indies. He returned to London in 1746, and in the following year married the beautiful and accomplished Miss Lascelles. "The Adventures of Roderick Random" was published in 1748. Its success was immediate, and has been permanent. It is a genuine book—a book written from actual observation of men and manners by a shrewd observer; and it contains characters which have become familiar friends of the reading world. In the following year he visited Paris, where he wrote a considerable portion of his second novel, "Peregrine Pickle," which he completed and published in 1751. In this year it was that, having obtained the diploma of doctor of medicine from a foreign university, he commenced practising as a physician, but by no means with success. In 1755 he produced his remarkable novel "The Adventures of Frederick Count Fathom." A year or two later he undertook the editorship of the *Critical Review*; in 1757 compiled a "Compendium of Voyages and Travels;" in 1758 issued his able and lucid but loose and inaccurate "History of England," a continuation of Hume. A political satire, "The Adventures of an Atom," appeared in 1769; and he closed in 1771 his long and laborious career with his last and perhaps his best novel, "The Expedition of Humphrey Clinker."

Notwithstanding Smollett's unceasing labours he had a hard fight to wage with poverty. His wealthy relatives looked upon the great novelist as a disgrace to their illustrious house, and rendered him, while living, no assistance, nor after his death, though they erected a monument to his memory, did they lend a helping hand to his unfortunate widow.

Smollett's only child, a beautiful girl of fifteen, died in 1763. Partly to relieve his over-wrought mind, partly to recruit his enfeebled frame, he made a journey through France and Italy, returning to England in 1766. He was advised to reside in a warmer climate. To assist his straitened means his friends sought for him an appointment to a consular position in some Mediterranean port, but in vain. His friend, Dr. Armstrong, however, procured him and his wife a house at Monte Nero, a village on the sea-shore near

Leghorn, where he completed "Humphrey Clinker," and where he died, on the 21st October, 1771, while yet only fifty-two years of age.

SMOLT. See SALMONIDÆ.

SMUGGLING is the offence of importing or exporting prohibited articles, or of defrauding the revenue by importing or exporting goods without paying duty on them. In countries where high protective duties prevail smuggling is always practised on an extensive scale, and it is generally observed that in such countries the smuggler is rather a popular person than otherwise. This was formerly the case in Great Britain, and the annals of the protective service contain the records of many hard fights on sea and land between the "free traders" and the coastguard, the country people being invariably on the side of the former. Tariff reform and a more effective system of inspection and watching have transformed the practice from romance to chicanery, and now tobacco and spirits form almost the only articles that tempt the professional smuggler to evade the laws restricting their importation. The present Acts relating to smuggling are, in fact, the Acts relating to the customs generally, viz., the Customs Consolidation Act, 1876, and the amendments which have been subsequently made to keep pace with the progress of the times. The penalty imposed upon smuggling is a fine of £100, or treble the value of the goods. The customs officers are entitled to search anyone on board a vessel in the United Kingdom, or anyone who has landed; and anyone obstructing an officer in the execution of his duty is liable to a penalty of £100.

SMUT is a disease of wheat and other cereals produced by minute fungi belonging to the group *USTILAGINÆÆ*. The smut of wheat, bunt, or pepper-brand is produced by *Tilletia caries*, and must be distinguished from *BUNT-EAR*, which is produced by a nearly allied species, *Ustilago carbo*. The smut affects the grains of wheat within the ear, changing the whole substance of the grain into a black greasy powder, which on being crushed gives out a most fetid odour. This black powder, when examined microscopically, is seen to consist of a mass of minute, roundish, brown spores or conidia. These spores remain unchanged while the grain is stored, but as soon as it is sown they begin to germinate and produce a long tube (*prothelium*), which enters the roots and ascends the axis of the plant; it grows and bears at its apex a crown of four to ten rod-like bodies, the sporidia, which grow and coalesce one with another, till at length the mycelium ramifies throughout the tissues of the plant; after producing sporidia several times in succession, the hyphae penetrating into the grains produce the conidia.

It is not easy in the field to distinguish smutted wheat from sound wheat, but the diseased grains are comparatively short and broad, and of a dark dull-green colour.

In the threshing or grinding the diseased grain or "smut-ball" is broken, and the fetid black powder is dispersed over the sound grain, thus greatly deteriorating the flour, and rendering the corn unfit for seed.

SMYRNA ("moss rose"), one of the most ancient Greek cities in Asia Minor. The old town lay on the north-east side of the Hermean Gulf, which is sometimes called the Gulf of Smyrna. Its origin is doubtful. It was known to the Greeks as "Old Smyrna," and disputed the honour with six other cities of being the birthplace of Homer; a grotto near the town was shown, in which it was said he composed his poems. After being destroyed and rebuilt, it became one of the finest and richest cities of Asia, and was included in the Roman province of Asia. Christianity was early established, and Polycarp is said to have been its first bishop, and to have suffered a martyrdom here. It was the seat of one of the "seven churches" of the early Christian period mentioned in Scripture. Towards the close of the eleventh century it fell into the hands of

Tzachas, a Turkish pirate, and was nearly destroyed by a Greek fleet under John Ducas. It was restored by the Emperor Comnenus, but soon after fell into the hands of the Genoese, who continued in possession of it until the year 1364. In 1402 it was taken by Tamerlane, and suffered very severely. Soon afterwards it came under the dominion of the Turks, and since then it has always been the most flourishing city of the Levant, notwithstanding its frequent visitation by earthquake, fire, and plague.

Smyrna, which the Turks call Izmir, is thus one of the very few ancient cities which have survived to the present time, and which retains anything like its former importance. It rises in the form of an amphitheatre from the sea, and upon the hill, the classical Mount Pagus, there is an ancient castle which forms the citadel; but very few traces indeed of its ancient buildings remain.

The modern city of Smyrna is about 210 miles S.S.W. from Constantinople. It is situated at the bottom of a capacious bay, and with its domes and minarets has a fine appearance on approaching it from the sea. There are some handsome stone houses, and of late years great improvements have been effected, not the least among them being the introduction of gas for lighting the streets in the European quarters, and the sinking of several artesian wells.

One of the greatest disadvantages under which the town labours is the intense heat, which sometimes prevails from June till the middle of September. Being surrounded by an amphitheatre of mountains, which concentrate the rays of the sun and interrupt the breeze, the heat during those months, if the *melas* or sea-breeze fails, is sometimes almost suffocating.

The principal edifices are—the Vizier Khan (constructed upon the marble ruins of the ancient theatre); the palace of the governor, barracks for 3000 men, built for the British army during the Crimean War; a handsome railway station; an English hospital and cemetery; several Jewish synagogues; Greek, Roman Catholic, Protestant, and Armenian churches; and about twenty mosques. The bazaars are large and well-stocked. Numerous coffee-houses and gardens are scattered along the banks of the river Meles, which enters the gulf east of the city; and extensive cemeteries, with tall minarets and groves of cypress trees, occupy portions of the declivity of Mount Pagus. The population is estimated at 150,000. The inhabitants are chiefly employed in agricultural pursuits, or are connected with the shipping and commerce of the port, the only industrial establishments of any importance being some steam ginning factories for making and stamping muslin for headresses, and others for the production of a common kind of cloth called Abba.

The port of Smyrna, considering its capabilities and easy access, is one of the finest in the world, being entirely surrounded by mountains, with deep water to within a short distance of the shore.

The entrance of the bay is commanded by a strong fortification, and as this passage is well lighted and marked out the navigation is not dangerous. There is weekly communication by steamers with Constantinople and other European ports, and also with Syria and Egypt. The imports consist chiefly of woollen, cotton, and silk manufactures; iron, tin, lead, and hardware goods, coffee, sugar, brandy, spices, cochineal, &c. The exports comprise bees'-wax, carpets, raw silk, cotton (of which large quantities are now grown in the neighbourhood), cotton thread, gall-nuts, gums, goat's hair, hides, liquorice, madder roots, oil, opium, raisins and figs, sesame, valonea, wool, wine, yellow berries, tobacco, sponges, and salt. A railway, 83 miles long, constructed by English engineers and chiefly with English capital, was opened to Aidin in 1872, and another in 1875 to Cassaba, a distance of 58 miles, now extended to Oneshak, 126 miles further.

SMYRNIUM is a genus of plants of the order of **UMBELLIFERÆ**, one species of which, popularly named *Alisander* or *Alexanders* (*Smyrniolum olusatrum*), is found in some parts of Britain, and was formerly employed for culinary purposes. Its flavour somewhat resembles that of celery, but is less agreeable and more pungent. The edible portions are the leaf-stalks, which were blanched, and used either as a salad or potherb. It occurs on the coast and in the neighbourhood of old manor houses. It is a biennial, with a stout branched stem about 3 feet high, ternate stalked, serrate leaves, and greenish-yellow flowers in dense rounded clusters. Since the introduction of celery it has gone out of cultivation.

SNAIL (*Helicidæ*) is a large family of molluscs belonging to the order *GASTEROPODA* and section *Pulmonifera*. The snails live on land, and breathe air by means of a respiratory chamber or lung formed by the mantle, with a small valve-like orifice placed on the right side beneath the margin of the shell. There is a large external spiral shell, into which the animal can be withdrawn; the shell has no operculum, but the aperture is closed during hibernation by the epiphragm, a layer of hardened mucus secreted by the mantle. This epiphragm is sometimes strengthened by a thin deposit of lime, and is always minutely perforated opposite the respiratory orifice. The visceral hump is spiral, and distinct from the foot. There is a short retractile head, furnished with four cylindrical retractile tentacles, of which the upper pair are the longest, and bear eyes at their tips. The lingual ribbon or tongue is broad, with numerous rows of small similar teeth. The species of snails are very numerous and most widely diffused over the surface of the earth. They are most numerous between the tropics, and some of the species in these countries are remarkable for their size and beauty. In cold countries they hibernate during winter, hiding under stones, clods of earth, or in crevices of walls, &c., and in some cases forming a kind of burrow in the earth. During this time the aperture is closed by a temporary operculum, the epiphragm, which is dissolved when the animal emerges in spring. In hot countries a similar period of torpidity is passed during the dry season. Snails are hermaphrodite, but mutual impregnation takes place. They possess a great power of repairing injuries, not only of the shell, but also of the soft parts, such as the tentacles, and even part of the head. They are long-lived and very tenacious of life. In one well-known instance a snail (*Helix desertorum*) brought from Egypt and fixed to a tablet in the British Museum attempted to escape after the lapse of four years, and being placed for a few minutes in tepid water completely revived and lived for upwards of a year afterwards.

The true snails (*Helix*) have the shell generally subglobose or depressed, with a short spire, and the last whorl very large; the aperture is regular, transverse, oblique, lunar, or roundish; the margins are distinct, and the peristome is thickened and reflected. The animal has a long foot, pointed behind. The species are very numerous, nearly 2000, and world-wide in their distribution, ranging to the north as far as the limit of trees, and southward to Tierra del Fuego. They are most abundant in warm countries and moist situations, and are found to a height of 11,000 feet in the mountains of South America. They are most active by night, when they seek their food, which consists chiefly of vegetable substances. From their voracity they cause great devastation in gardens and fields. During the day they conceal themselves under stones, old trunks of trees, &c., but a shower of rain will bring them out in great numbers. The eggs are laid about the end of spring; they are small, round, and whitish, enveloped in a shell, and deposited in little heaps in moist places; the common garden snail lays between thirty and fifty.

The Common Garden Snail (*Helix aspersa*) is a native of Britain and Europe, but is now naturalized in most

parts of the globe. It, with some other species, forms the favourite food of the blackbird and thrush. This species, boiled in milk, is used as a remedy in consumption. The Edible or Roman Snail (*Helix pomatia*) is a large species, a native of the south of Europe, and has probably been naturalized in Britain. These snails were used for food by the Romans, who reared them in regular inclosures (*cochlearia*), fattening them with new wine boiled down and meal (Pliny). A similar practice prevails in many parts of the south of Europe, where they are largely eaten, especially during Lent. In England too they were formerly esteemed for food. Snails are also eaten in Brazil. The fossil species of *Helix* are numerous, dating from the Eocene rocks. The most important of the other genera of this family are *Vitrina* (GLASS-SNAIL), *Succinea*, *Bulimus*, *Achatina* (AGATE-SHELL), *Pupa*, *Cylindrella*, and *Clausilia*.

SNAKE is a term synonymous with SERPENT. The Common Snake of Britain (*Tropidonotus natrix* or *Natrix torquata*) is common throughout Europe from Scotland and the north of the continent down to Italy and Sicily, and is also found in the north of Asia; it does not occur in Ireland. It is a harmless species, belonging to the family Colubridæ. The Common, Ringed, or Water Snake, when full grown, attains a length of 5 feet, though in this country it seldom exceeds 4 at the utmost. The female, as is usual among snakes, is larger than the male. The body is long, the middle of the back elevated; the neck is narrow, and the tail very tapering and rather pointed at the extremity; the head is broad and depressed, distinct from the neck, and the gape of the mouth is as long as the head, slightly curved, and rising posteriorly; the teeth are small, curved backwards, and the tongue is long, very flexible, and forked to about one-third of its length. The upper part of the head is covered with broad flat plates; the scales of the back are oval, imbricated, with an elevated keel; those of the sides are broader and less keeled; the belly is covered with broad oblong plates. The upper parts of the body and head are of a light brownish-gray colour, with a green tinge, sometimes approaching to a dull pale olive. Behind the head, on the upper part, is a broad collar, or two lunate spots, of a bright yellow colour, and immediately behind these are two broad transverse spots of black; down the back run two rows of small black spots, arranged alternately, with larger ones at the sides. The belly is of a pale blue or lead colour, marbled with black. The colours and markings, however, vary very much. It is gentle in its habits, and may be easily tamed. When attacked or seized by the hinder part of its body, it rolls itself up in a spiral form, and defends itself by ejecting at its assailant a disgusting fetid liquor, secreted by certain glands within the vent. It seldom attempts to bite, and the bite is quite harmless. In England, with the exception of the little common lizard, it is the most abundant of all our true reptiles. It inhabits all our woods, heaths, and hedgerows, especially in the neighbourhood of water, where it finds the principal part of its food. This consists chiefly of frogs and small fishes, though it also eats small birds and their eggs, mice, lizards, insects, and worms. Frogs, however, in this country appear to be its favourite diet. After a meal it remains inactive for many days. It swims with ease and rapidity in the water, is very active on land, and sometimes climbs trees. The common snake is oviparous, depositing its eggs in a warm place, from sixteen to twenty in number, connected together by a glutinous substance; the eggs are hatched in about three weeks. In temperate climates the common snake becomes torpid during winter. When the temperature falls, it seeks some deep hole in the ground where the cold is not able to penetrate, and there it remains, often in company with several others, till the genial warmth of spring brings it forth again. In the month of April it

changes its skin, and this process may be repeated several times during the summer. The common snake is easily tamed, and may be made to distinguish those who caress and feed it.

SNAKE ROOT. See ARISTOLOCHIACEÆ and POLYGATA.

SNAKE WEED. See POLYGONUM.

SNAKE-FLY (Raphidia) is a genus of insects belonging to the order NEUROPTERA and section Planipennia; it is by some placed in the family Sialidæ, but by others made the type of a distinct family, Raphidiidæ. The snake-flies (see fig. 4 in Plate NEUROPTERA) are remarkable for the great elongation of the prothorax, to which is attached by a thinish neck a broad flattened head; the head is capable of great freedom of motion, and gives the insect a curious resemblance to a snake. The abdomen is short and broad, and furnished in the female with a long ovipositor. The species are not numerous, the majority being inhabitants of the south of Europe; five species are found in Britain. Both the perfect insects and the larvæ feed on insects; the latter live under the bark of trees; the pupa is not inclosed in a cocoon, but is inactive in its earlier stage.

SNAKE-WOOD, LETTER-WOOD, or LEOPARD-WOOD, is the heart-wood of *Brosimum Aubletii*, a large tree belonging to the genus *Brosimum* and order Artocarpaceæ. The tree is a native of the forests of British Guiana and Trinidad, growing to a height of 60 or 70 feet, with a diameter of 2 or 3 feet. The heart-wood of this tree is exceedingly beautiful, being of a rich brown colour, mottled with irregularly shaped dark spots; it rarely exceeds 7 inches in thickness, and is very hard and heavy. From its beauty and value this beautiful wood is not much used; it is chiefly employed in the country for fine veneer and inlaying work. The names snake-wood and leopard-wood refer to the dark spots, which are arranged with great regularity, and the name letter-wood to their resemblance to the thick letters of black-letter printing.

SNAP, SCOTCH. See SCOTTISH MUSIC.

SNAP DRAGON (*Antirrhinum*) is a genus of plants belonging to the natural order SCROPHULARIACEÆ. The species are natives chiefly of the Mediterranean region. They are annual or perennial herbaceous plants, with the upper leaves alternate and the lower often opposite. The flowers are either solitary and axillary, or form terminal racemes; they have the calyx five parted, the corolla with a broad tube swollen at the base, but not spurred, and the mouth closed by a large projecting bearded palate. The fruit is a two-celled oblique capsule, opening by two or three pores at the top. The English name refers to the spring, or snap, with which the mouth closes after the lips are forced apart by the hand. Two of the species are found in Great Britain. All of them produce showy flowers, and are much cultivated in gardens.

The Great Snapdragon (*Antirrhinum majus*) attains a height of 1 or 2 feet, and has purplish-red or white flowers. It is found in Great Britain on old walls and chalk cliffs, especially in the neighbourhood of London; but it is undoubtedly a naturalized plant, being truly indigenous in the south of Europe and the north of Africa. In gardens a variety is often seen with double flowers. The leaves are bitter and slightly stimulant. In Persia an excellent oil, equal to that of the olive, is said to be procured by expression of the seeds of this species.

The Orontium Snapdragon or Calves'-Snout (*Antirrhinum Orontium*) is a native throughout Europe, in the islands of the Mediterranean, and the north of Africa. It has been found in Virginia, but it has been probably introduced. It is found in the south of England and Ireland in dry, sandy, and gravelly fields. It is about a foot high, with purple flowers. Its leaves, as well as those

of other species, have been used as cataplasms in indolent tumours.

There are twenty-three other species, many of which have been introduced into our gardens. They are pretty border-flowers, and adapted for rock-work. They are easily cultivated; the perennial species may be increased by cuttings, and the annual raised by seeds. The species from subtropical districts will, however, require a frame or the greenhouse in the winter.

SNEEZE-WOOD (*Pterorylon utile*) is a tree of the order SAPINDACEÆ, a native of Southern Africa. Its timber is firm, strong, durable, and in beauty resembles mahogany. Its sawdust is remarkable for exciting violent sneezing in persons working at the wood, whence its English as well as its Dutch name (*Nishout*). The wood is used at the Cape for making articles of furniture and agricultural implements, and is also employed for mill-work and bridges, as it is not much affected by moisture. The tree is about 30 feet high, with pinnate leaves and axillary bundles of flowers.

SNEEZING is a variety of coughing, resembling it in being a quick forcible expiration after a temporary closure of the glottis, burst open by a sudden strong pressure of the abdominal muscles on the lungs, and differing from it in that the blast of air instead of going directly through the throat and mouth, and clearing them, is directed by an instinctive contraction of the pillars of the fauces and descent of the soft palate chiefly into the nose, whence therefrom it expels any offending foreign matter.

The reason of the common custom of saying "God bless you" to one who has just sneezed, though long sought for, has not yet been discovered. A similar custom held among the ancient Greeks, and some say that it was to avert the evil omen of sneezing, for this was one of the worst signs of the approach of the pestilence, as we know from Thucydides to be the fact. A like reason is given for St. Gregory's supposed order to the faithful to bless a sneezer, but the custom was known in Italy in the times of the ancient Romans. It is found also among native tribes in America, and among the inhabitants of Central America and elsewhere.

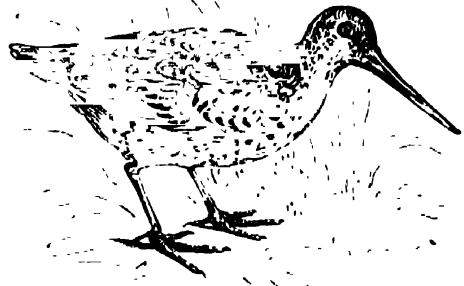
SNIDER, JACOB, inventor of the Snider system of rifling guns, came to England in 1859; and his process for the conversion of the Enfield rifle to his own system was adopted by the British government in 1866. He died in that same year.

SNIPE (Scolopacinae) is a subfamily of the SCLOPACIDÆ, a large family of birds belonging to the order GRALLÆ. The bill is long, straight, and slender, flexible, and blunt at the tip, covered with a soft sensitive skin, abundantly supplied with nerves; the upper mandible is slightly longer than the lower, and grooved on the sides in which the nostrils are placed. The wings are moderate and pointed, the tail short and rounded. The legs are short, slender, and feathered low down; the anterior toes are long and slender, and are usually free, while the hind

The Common Snipe (*Gallinago collesis*) is common in the northern parts of both hemispheres, and breeds throughout Britain in marshy places and moors; it is most abundant, however, in Britain in the winter, as a considerable number visit this country in the autumn from Northern Europe, passing north again in spring to breed. The snipe is about 10½ inches in length, of which the bill measures about 2½ inches. The general colour of the upper parts is blackish-brownish, varied with rich buff or fawn colour; the under surface is white, the sides and flanks grayish-white barred with dusky black, and the under tail-coverts pale yellow brown, barred with grayish-black. The bill is brown, ash-coloured at the base, and the feet are greenish-brown. The snipe inhabits marshy places, where it probes the soft ground with its long bill in search of worms, insects,

and their larvæ. The nest is a very slight structure, composed of a little dry grass or other herbage, and placed in a small hollow in the ground, often under the shelter or in the midst of a tuft of grass or rushes. The eggs are large, four in number, pale, yellowish or greenish-white, the larger end spotted with white. The wild zigzag flight of the snipe on being flushed is well known to sportsmen. A curious bleating or humming noise, referred to in the local names of "moorlamb" in Lincolnshire and "heather-bleater" in Scotland, is produced by the snipe during the breeding season; it is always uttered on the wing, the bird soaring to a great height and descending again very rapidly. It is one of the most esteemed of our game birds.

The Great Snipe or Solitary Snipe (*Gallinago major*) is a larger species, measuring about 12 inches in total length.



Solitary Snipe (*Gallinago major*).

The plumage is varied with black and bright reddish above, the red arranged longitudinally, and is whitish-red below. It is widely distributed throughout Europe, and extends into Asia; it visits this country regularly in the autumn in small numbers. In its habits it agrees with the common species, but prefers drier situations. The Jack Snipe (*Scolopax* or *Gallinago gallinula*) is a much smaller species, a winter visitor to Britain, though a few remain to breed in the north of Scotland. It is about 8 inches in length, with the back a rich dark brown with green and purple reflections. The Red-breasted Snipe (*Macrorhamphus grœcus*), a North American species, occurs occasionally in this country. The Common Snipe is represented in North America by a nearly allied species, *Gallinago Wilsoni*. The Painted Snipes (*Rhynchœa*) from the Cape, India, and Australia are remarkable in that the female is more richly coloured than the male. The genus *Scolopax* contains the Woodcocks.

SNORRO (or **SNORRI**) **STUR'LESON**, son of Sturla, was born at Hlvausma, in Iceland, in 1178. When Snorro had scarcely attained his fourth year his father died, and he was thenceforth educated at Odli, in the house of Jon Loftson, the most learned man of the age. His education was conducted with great care. Although his father had been the chieftain of an Icelandic tribe, the son appears to have been poor, until his marriage with a wealthy lady, whom some years afterwards he deserted. He managed his newly-acquired property so well that he became as distinguished for his wealth as for his learning. He gradually rose to the rank of Landur-Madur and of Jarl, the highest title next to that of duke. During this period of his prosperity he composed some of the most beautiful tales (*sagas*) that exist in the Icelandic language. His moral character, however, was not equal to his intellectual. He was avaricious and quarrelsome, and a party was formed against him, which drove him from the island (1284). He afterwards returned to Iceland, where he was murdered by his own sons-in-law (1241).

Snorrio is one of the greatest and the last of the northern Scalds. His most important work is the "Heimskringla," or Mythic Ring of the World, a beautiful collection of sagas, consisting partly of Scaldic songs by Snorrio himself, and partly of the poems of early Scalds, whose poems are interwoven in the sagas of Snorrio. A second edition of this collection was published, with a Danish and Latin translation, at Copenhagen, from 1777 till 1826. It has also been translated into German by Wachter, who has added a valuable historical and critical introduction. Other works also are ascribed to Snorrio, which form part of the "Skaldia" edited by Rask (Stockholm, 1818) under the title of "Snorra-Edda ásamt Skáldu."

SNOW. When the aqueous particles produced by the precipitation of vapour [see RAIN], in descending through the atmosphere, become frozen in separate crystals of ice, and these afterwards unite together in such a manner as to reflect light to the eye in great abundance from all, thus producing a sensation of whiteness, the assemblages of crystals constitute flakes of snow. When the atmosphere is tranquil and the temperature very low, the small flakes are found to consist of brilliant spicular icicles, which diverge from a centre in six directions, and resemble stars having so many rays, upon each of which small crystals are sometimes formed; but when the atmosphere is agitated, the original flakes strike against each other, and uniting in groups, they descend in irregular forms. In regions of the earth far to the north or south, the air, when allowed to enter through a small aperture into a heated apartment, has frequently caused the warm vapour to be converted into snow. Snow has also been observed to fall in a fine powder, and then it is considered as being in an elementary state.

Snow in the form of cylinders and spheres or spheroids has been occasionally observed in North America. These are produced by snow deposited in a second shower upon some which has previously fallen, and the surface of which has been covered by a thin coating of ice; their forms arise, in most cases, from the masses being rolled on the ice by the action of the wind. The greatest of the cylinders as yet examined was $2\frac{1}{2}$ to 3 feet in diameter; and the spheres varied from 1 inch to 15 inches in diameter.

That animalculæ exist in snow is evident from recent observations. Dr. Muro having first examined some water in a glass by means of a microscope, and found it quite pure, put into the water a quantity of snow; he then found that, on solution, the water exhibited in full activity hundred of animalcules, which, when viewed through the microscope, resembled very diminutive shrimps, and were quite unlike the eels discovered in acetons acid. Red snow is due to the presence of a very minute fungous plant. [See RED SNOW.] It may be observed here, that snow-water, being drunk, is considered as unfavourable to the human constitution; the affections of the throat to which the people in some parts of Switzerland are subject, are thought to be caused by its deleterious qualities. There are over a thousand known distinct varieties of snowflakes, some of the most typical of which are figured in the Plates illustrating this article. All are based upon the hexagonal figure, or rayed figure of 60 degrees. The lightness of these flakes may be judged of from the fact that fine snow falling in a still air takes up twenty-four times its space in water; ordinary snow lies closer and averages about ten times the space of water.

In the Plates, figs. 1 to 28 show some of the forms of snowflake in spicules of hexagonal designs. Figs. 29 to 33 are unusual or anomalous forms. Figs. 34 to 48 are pure snow crystals, hexagonal plates, or made up of hexagonal plates. Figs. 49 to 67 are combinations of these two classes, plates and spicules, and are by far the most usual forms of snowflake. Figs. 68 and 69 are unusual twelve-rayed forms, possibly two flakes symmetrically posed one upon

the other. Figs. 70 to 73 show some rare and very beautiful forms of crystals, and figs. 67* to 69* are still rarer forms, pyramidal in shape. Hail sometimes takes this pyramidal form, as in figs. 74 to 77, and it undoubtedly results from a hailstone, such as that in fig. 73* bursting into pieces. Sometimes, as in fig. 75, a little piece of the hard core of the original hailstone is seen forming the apex of the "pyramidal hail." Figs. 70* to 73* are hailstones, and illustrate the article HAIL. Fig. 70* shows how a large hailstone is often a congeries of small stones, and when cut across and examined under a good glass, such a large stone will exhibit the concentric lamellar structure of figs. 71* and 72*. Fig. 73 is a hailstone of more highly organized structure, with concentric lamellæ, making a hard core, and stellular fibrous crystalline forms surrounding it, the external points of these crystals having been blunted by incipient melting.

SNOW, RED. See RED SNOW.

SNOW BUNTING (*Plectrophenax nivalis*), a species of passerine birds, nearly allied to the true BUNTINGS (Emberiza), but differing in the great length of the hinder claw. The snow bunting inhabits the extreme north of both hemispheres, passing to more southerly regions in the winter. It is a winter visitor to Britain, though a few remain during the summer to breed in the Highlands of Scotland and in the Shetlands. The snow bunting, snow-fleck, or snow-flake is about 7 inches in length. It has the back variegated with black and brown, and the top of the head reddish-brown; the primaries and secondaries are black, with narrow white edges; the wing-coverts and tertiaries are white, and the tail-feathers black, varied with white; the lower surface is white, with a reddish tinge on the breast and flanks. In summer the head becomes white, the back black, and the breast loses its reddish tint. In this country the young birds are the first to make their appearance, accompanied by females; the adult males come rather later. The birds are more abundant in the northern and mountainous parts of the country than in the south; they frequent elevated pastures throughout the winter, but descend in very severe weather to the oat-stubbles; or, if the snow lies deep, even to the seacoast. They run readily upon the ground like the larks, and seldom perch. They breed among the rocks of the most northern islands, making a nest of dry grass lined with deer's hair and feathers; the young are fed upon insects and grubs. The food of the parent birds consists principally of seeds of various kinds and buds. The snow bunting is highly esteemed for food in the northern countries in which it is common. There is a smaller species, the Lapland Bunting (*Plectrophenax lapponicus*), agreeing with the snow bunting in distribution, but it is a very rare winter visitor to this country.

SNOWBALL TREE. See GULDEN ROSE.

SNOW BERRY (*Symphoricarpos racemosus*) is a bushy deciduous shrub belonging to the order CAMPYLOCLADACEÆ, a native of North America, and cultivated extensively in gardens in this country. It is so called from the clusters of large white berries which ripen in autumn, and remain on the tree after the leaves; they are uneatable. It has entire, opposite leaves, and small bell-shaped white or rose-coloured flowers.

SNOW DON, a mountain of North Wales, in Carnarvonshire, 9 miles south-east of Carnarvon, the highest in South Britain, its elevation being 3571 feet above the level of the sea. There is an inn on the top. The group of which it forms the centre is called Snowdonia. The rocks are Cambrian slates, in which a few fossils have been found. Snow lies on the summit from November to May. This summit has been used to obtain the basement measurements for the ordnance surveys of the country on several occasions. In 1886 an observatory was temporarily erected on a large stone pile which crowns the

top of the mountain, from which observations were taken to all the principal points in sight, in order to obtain the altitudes and horizontal distances between each of the

same. The name Snowdon, translated from the Welsh *Creigiawr*, snowy hill, is also used for the whole range, reaching from Nevin to near Conway.



Snowdon, from Capel Curig.

SNOW DROP (*Galanthus*) is a genus of plants belonging to the order AMARYLLIDACEÆ. The Common Snowdrop (*Galanthus nivalis*) is a native chiefly of the south of Europe, growing in woods and pastures. It is found in some places in England and Scotland, but has probably escaped from cultivation and become naturalized. It is a dwarf bulbous plant, with two narrow linear leaves, and a flower-stalk (scape) 3 to 6 inches high, bearing a single drooping fragrant flower. The flower is white and bell-shaped, with the three inner segments of the perianth dotted with green, erect, shorter than the outer, and notched at the summit, and the three outer segments pure white, concave, and spreading. The snowdrop blooms very early, the flower often appearing in February, and it is therefore welcomed as the harbinger of spring. A double variety is much cultivated. The Crimean Snowdrop (*Galanthus plicatus*), cultivated in this country, is a larger and handsomer plant, with broad plate leaves.

SNOWDROP TREE (*Halesia*) is a genus of plants belonging to the order STYRACÆÆ, so called from the resemblance of the pure white drooping flowers to those of the snowdrop. The species are natives of the United States, where they are also known as silver-bell trees. They are shrubs or small trees, with large deciduous alternate leaves and bell-shaped four-parted flowers in clusters or short racemes, arising from the buds of the previous year. The best known species is *Halesia utrapectra*

which is a handsome tree, sometimes attaining a height of 50 feet, but usually much smaller.

The name snowdrop tree or snow-flower is also applied to the *Chionanthus virginica*, a shrub or small tree belonging to the order OLEACEÆ, with large smooth deciduous leaves and clusters of white flowers. It is a native of North America, but is cultivated in this country as an ornamental plant, blossoming in June.

SNOWFLAKE (*Leucojum*) is a genus of plants belonging to the order AMARYLLIDACEÆ. The snowflake is nearly allied to the SNOWDROP, but the scape bears from one to seven flowers, and the segments of the perianth are all equal. The Common Snowflake (*Leucojum aestivum*) is much larger than the snowdrop, its scape being about 2 feet high, bearing from three to seven large bell-shaped, fragrant, white flowers, each division of which is tipped with green. It is found in wet meadows in England, and blooms in late spring or early summer. The Spring Snowflake (*Leucojum vernum*, sometimes placed in a separate genus, *Erinostema*) differs in having a single large drooping flower, white, tipped with green, on a scape about a foot high. It flowers in early spring. The Autumn Snowflake (*Leucojum autumnale*), a native of Southern Europe, has narrow leaves, and a scape 6 inches high, bearing two or three small flowers, pure white or suffused with rose, that appear in September. This is now referred to the genus *Acis*. It is cultivated in gardens.

SNUFF, a fragrant powder prepared from tobacco for the purpose of being sniffed up the nose as a stimulant or gentle irritant. The finer descriptions of snuff are manufactured from the soft portions of the best leaf tobacco, but commoner qualities are made from the coarser and damaged portions of the leaves, the mid ribs, stems, and stalky parts, with the dust sifted from the bales, and stray fragments unfit for other purposes. In the process of manufacture, the material, which has been matured by fermentation in closed rooms, is pulverized in conical mortars or "mills," and having been reduced to powder of the desired grain, is afterwards flavoured and perfumed. There are two kinds of snuffs, the "dry," as Scotch, Irish, Welsh, Spanish, Lundyfoot or Irish Blackguard, &c.; and the "moist" or *rappees*, of which there are many varieties. French rappee, which enjoys a justly deserved reputation, is prepared in the government factories by means of a very elaborate process, carried on largely by automatic machinery. The tobacco used undergoes fermentation twice, and the whole process of manufacture requires nearly a year and a half for completion. The practice of snuff-taking was introduced into Europe from America during the sixteenth century, and by the middle of the following century it had become very general and very fashionable in all polite society. Great skill was displayed in the manufacture of snuff-boxes—gold, silver, precious stones, enamels, and the most elaborate of miniature paintings being pressed into service; and many of the finer specimens made during this period are now preserved as heirlooms or in the art museums of Europe.

SNYDERS, FRANS, born at Antwerp in 1579, was a pupil of Hendrik van Balen, and for a time followed the style of his preceptor, confining himself to the representation of fruit, flowers, and other objects of still-life. He soon attempted the more difficult task of painting animals, in which he remains to this day, if not without a rival, at least inferior to no other artist of his country, if Rubens be excepted. During part of his career he lived at Brussels, having been invited there by the Archduke Albert, governor of the Low Countries, for whom he painted some of his finest works, particularly a stag hunt. This was sent by the archduke to Philip III., who was so charmed with it, that he gave the artist commissions for several large pictures of huntings and other similar compositions, which, down to a recent date, were preserved in the old palace of Buen Retiro. Rubens and Jordaens both availed themselves of the talents of Snyder in his peculiar vocation, and there are known to be several pictures in existence the joint production of these three great but friendly rivals. His works, though unrepresented in the National Gallery, are in many of the best private collections in England. He died at Antwerp in 1657.

SOANE, SIR JOHN, an architect of importance in his day, though now not much considered, who built the Bank of England, upon designs modified from the famous temple at Tivoli, in 1788, and who was professor of architecture in the Royal Academy in 1806, was born at Reading in 1753, and died in London in 1837. He studied at the Royal Academy from 1772 onwards, and travelled in Italy from 1777 to 1780, working at his art. He was elected a fellow of the Royal Society in 1821, and knighted in 1831. Sir John Soane's house in Lincoln's Inn was a perfect storehouse of curiosities and antiquities, and this he gave intact to trustees for the benefit of the nation in 1838. It is a most interesting if slightly multifarious little museum, and well repays a visit. One cupboard he solemnly ordered not to be opened till the close of 1886. Public curiosity was greatly excited by the existence of this "secret chamber," but it proved that there was nothing to be discovered of any public importance, and the reason for such a solemn injunction was not apparent.

SOAP (Lat. *sapo*; Celt. *sebon*). This term originally meant the compounds derived from the union between fatty bodies and the alkalis, potash and soda; and although it is usually thus limited in its meaning, it has nevertheless been extended to compounds of oleaginous bodies with some earthy and metallic bodies, having but few properties in common with soap properly so called. It was little known to the ancients, and Pliny, who first mentions it, speaks of it as a curiosity invented by the Gauls. The Romans employed fuller's earth. *Savon*, the French word for soap, used absurdly to be ascribed to its having been manufactured at Savona, near Genoa. Soap was first manufactured in London in 1524, before which date it was obtained from Bristol.

It was found by Chevreul that different varieties of fatty matter consist chiefly of two kinds: one hard, to which he gave the name of *stearin*; and the other soft, which he termed *olein*. He also discovered that stearin is composed of stearic acid and a peculiar principle which, on account of its sweet taste, he named *glycerin*; and it was further proved by his experiments that olein consists of oleic acid and glycerin; stearin is therefore a stearate of glycerin, and olein an oleate of the same substance.

When, in the manufacture of soap, a strong solution of an alkali (soda, for example) is heated with tallow or oil, the soda gradually replaces the glycerin and combines with the stearic and oleic acids, forming soap, or in other words, a compound of stearate and oleate of soda, the glycerin remaining in solution.

The soaps made with soda are called hard soaps, and on exposure to the air become hardened by drying; those made with potash are called soft soaps, and do not dry, but become deliquescent on exposure.

Many different kinds of fat and oil are used in soap-making, such as tallow, palm oil, kitchen stuff, train oil, and other fish oils, cocoa-nut oil, the grease obtained in bone boiling, linseed, cotton seed, and poppy oil, olive oil, almond and rape oil, and resin, the process of manufacture being briefly as follows:—A quantity of any of the above-named fats is introduced into a vessel made of riveted iron plates and termed a soap-pan (which is sometimes 11 or 15 feet wide, and of the same depth, being capable of holding from 20 to 30 tons), where it is heated by means of external heat or by a steam pipe inside. To the melted fat in the pan is added a "ley" or solution of caustic soda, made by boiling a solution of carbonate of soda with lime. The leys are at first weak, stronger solutions being added from time to time, the excess of alkali being neutralized by the addition of fresh fat until the pan is filled and combination has taken place. As soon as the latter stage is reached the soap is salted out by the addition of about 10 lbs. of common salt to every 100 lbs. of fatty mixture, the effect being that the soap is rendered insoluble in the strongly salted liquid, and rises to the top, leaving the brine and glycerin below. The watery substratum is then drawn off, and the soap is boiled with a weak solution of caustic soda, whereby the soap is consolidated into a homogeneous mass, salt being again added to separate the soap from its solution, and it is then run into suitable iron frames or moulds, where it is left to cool. When cold the soap is cut up into bars by a strongly framed apparatus, on which thin strong wires are strung, the under part, which is soft, being scraped off and used in future operations. Good white or curd soap ought to contain when made about 30 parts of water, 63 of fatty matter, and 7 parts of soda to each 100, and if it is kept in a dry atmosphere it parts with some of the water, and gains in hardness and usefulness. There are, however, certain practices known to soap-makers whereby soap can be made to take up an excessive quantity of water, and yet present a hard and firm appearance.

In making marine soap, which is made from cocoa-nut oil, the process of salting is dispensed with, as this soap is soluble in brine, and therefore can be used with salt

water. Glycerin is an important article of commerce, and is now largely separated from the soap lees. At one time kelp was used as the source of soda, and iodine was first manufactured from soap lees as a by-product. Now caustic soda and caustic potash are employed, and will probably be exclusively used.

In mottled soap the paste is watered, when it is nearly finished, with a strong solution of alkali containing sulphides; the paste is broken up, in order that the mottling liquid may trickle into the cracks formed. Mottled soap is valued because when it is properly made it contains a definite, and not an excessive quantity of water; but imitations of mottled soap are often made by the addition of colouring matters to the soap when it is in the soft state, and these imitations do not contain a definite quantity of water. The colour is due to sulphide of iron. Among other soaps manufactured in England, the more important are *yellow* soap, composed of tallow, resin, and soda, to which some palm oil is occasionally added; *brown* soap, made from palm oil and resin.

Marseilles and Castile soaps are made with olive oil and soda. In making soft soap the potash solution is boiled down to a jelly with the train oil usually employed, the glycerin being retained. This soap is generally strongly alkaline. Even the hard soaps are usually alkaline, and many processes have been suggested and employed to obtain a perfectly neutral soap, the presence of an alkali being injurious to delicate skins, and therefore objectionable for toilet purposes. The soap may be reined by melting carefully and washing with weak brine. The best known neutral toilet soap is a transparent variety which is obtained by dissolving ordinary hard soap in methylated spirit, filtering the solution and distilling off the spirit until the soap has acquired a consistence to solidify on cooling. Another toilet soap is made to float on water by beating a thick solution into a lather before placing it in the moulds; the air thus included gives it the necessary buoyancy. Glycerin toilet soap is made by adding glycerin to the hot soap before putting it in the frames. Toilet slaving cream is a soft soap of potash and lard. All these soaps are perfumed with a great variety of odorous oils. Nitrobenzene also is much used, as giving a cheap odour of

lily of the valley. A little of blue or red colour is also given to these soaps by the addition of ultramarine, vermilion, and other colouring matters. When common salt is added to a potash soft soap the soda combines with the fatty acid, forming a hard soda soap, and the potash is displaced. This method of manufacture was formerly much employed in Germany.

Sodium silicate, or soluble glass is now also largely used in making cheap soaps; the solution is mixed with the ordinary soap before framing. This mixture has great value as a preservative, and is used on a very extensive scale as a cheap soap for domestic and manufacturing purposes.

Railway wagon grease or anti-friction is a rough kind of soap of considerable importance. It is used for the axle boxes of the carriages and waggons, and differs greatly in composition, but the general principle is the same; it is a mixture of palm oil, tallow, and other cheap fatty bodies with carbonate of soda, and sometimes with milk of lime, or both. Potash and soda soaps are soluble in hot water and in alcohol, but the solution in water is always milky from the deposition of a little fatty acid, an equivalent proportion of the alkali being also liberated. This is the active ingredient in removing grease, &c. It is quite insoluble in water containing more than 45% of common salt. Solutions of soap are decomposed by acids, the fatty acids being precipitated. The stearates, oleates, and palmitates of calcium and magnesium are also soaps, but insoluble in water, and it is the precipitation of these salts which forms soap scum. In a hard water containing a large proportion of these alkaline earths, the soap is expended

to combine with and precipitate these before any detergent effect can be obtained. Hence hard waters containing lime and magnesian salts are wasteful in the use of soap, and in a large city with such a water supply the extra soap consumed on this account forms in the aggregate a considerable item in a householder's expenditure. A soap test is employed in analysis for the rapid estimation of this hardness; it is a solution of white curd soap in alcohol. The amount required to produce a lather indicates directly the quantity of lime or magnesian salts in the water.

The soap manufacture is one of considerable importance, the principal seats in England being Liverpool, Runcorn, London, Brentford, Bristol, and Hull; there are also soap-works of considerable extent at Bromsgrove, Newcastle, Gateshead, Warrington, and Plymouth. In Scotland two-thirds of the total quantity of soap are made at Glasgow and Leith. Belfast, Londonderry, Limerick, and Cork are the principal seats of the manufacture in Ireland. No very close estimate can be formed of the quantity of soap used at home, but the exports from the United Kingdom amount to over 20,000 tons per annum.

Medical Uses of Soap.—*Sapo duris* or hard soap, and *Sapo mollis* or soft soap, are both official in the British Pharmacopœia. Both are made from olive oil, with soda and with potash. Hard soap rubbed up with vegetable resins and balsams mixes well with them, and thus they become soluble in water. This circumstance is utilized in pill-making, for the resins used with soap are dissolved in the stomach, whereas if taken simply they might pass unchanged through the intestines. Soap alone is a mild antacid, and it possesses also a slight aperient action. It is given in rheumatic affections, in gout where swellings appear in the joints, for the removal of gall-stones; and in combination with rhubarb it is administered in cases of constipation with torpid liver. It has also been administered with good results as an antidote in cases of corrosive poisoning. Soaps are sometimes medicated with antiseptic and other substances, such as creosote, carbolic acid, thymol, salicylic acid, iodoform, tar, and sulphur, and in this form they are used as detergents and in diseases of the skin. A liquid soap of ammonia is used as a liniment. Ordinary soap liniment is prepared with soap, camphor, oil of rosemary, rectified spirit and water, and it forms the basis of numerous other liniments known by special names. One of the best known liniments is Carron oil, a mixture of linseed oil and lime-water, used as an application to burns. Several insoluble soaps or stearates and oleates are also used in medicine. The common lead or diachylon plaster is an oleate of lead, made from olive oil and oxide of lead. Stearate of lead is also used. Oleates of copper, mercury, and zinc are true soaps, and are all employed in outward application in skin diseases. The oleates of some of the alkaloids, as aconitine, atropine, morphia, and veratria, are all used in painful neuralgic affections.

SOAP BERRY (*Sapindus saponaria*) is a West Indian tree of the order SAPINDACEÆ, which derives its name from the pulp of its fruit being useful for washing purposes. The genus *Sapindus* contains trees and shrubs from tropical countries in both hemispheres. The fruits are fleshy externally, and those of the soapberry and some other species contain *saponin* in their outer covering in sufficient abundance to produce a lather with water, and hence are used as a substitute for soap. The fruits contain excessively hard, round, black seeds, which are used for making buttons, necklaces, rosaries, &c.

SOAPSTONE. See POKSTONE.

SOAP WORT (*Saponaria*) is a genus of plants of the order CARYOPHYLLACEÆ, nearly allied to the genus *Dianthus* (Pink), from which it is distinguished by the absence of the bracts at the base of the calyx. The Common Soapwort (*Saponaria officinalis*) flourishes on the banks of streams

and in copses and sheltered places in most parts of Europe. It is found in Britain, but always near dwellings, and is probably not a true native. It has large, handsome, rose-coloured, fragrant flowers, collected into a dense terminal raceme. A variety with double flowers is cultivated in gardens. Both the root and the leaves contain saponin; and the root is also useful for medicinal purposes. Most species of this genus are capable of being employed as a substitute for soap.

SOB'ING is the term for a series of convulsive inspirations at a time when the glottis is closed, and to which it gives way with some violence, causing a characteristic sound.

SOBIESKI, JOHN, an illustrious Polish leader, was born in 1629, in the district of Olesko, in Galicia. He was carefully brought up by his father, who was castellan of Cracow and governor of Poland, completed his education at Paris, served for some time in the body-guards of Louis XIV., and travelled with his brother in France, Italy, and Turkey. He served in the Polish army with distinction against the Cossacks and Tartars, as well as against the Swedes and Russians. In 1660 he gained a victory over the Muscovite general Sheremetov; and for several years continued to fight with success against both Muscovites and Tartars, until raised to the dignities of grand marshal and grand hetman of Poland.

In 1667 Poland was invaded by 100,000 Cossacks and Tartars. Sobieski marched to meet them at the head of only 20,000 men, routed them, and compelled them to sue for peace. In 1671 he defeated the Turks, who were led by Mahomet IV.; and took from them the fortress of Kotzin, till then considered impregnable. In 1674, on the death of King Michael Wicznowiecki, he was unanimously elected King of Poland under the title of John III. He found the country in a state of exhaustion, the regular army consisting of only a few thousand men, and the treasury empty. Sobieski raised several regiments at his own expense, and then marched to oppose the Turks, who were advancing with a large force. Besieged in Lemberg by a formidable Ottoman force, with a small but devoted band he issued from the town during a snowstorm, and completely routed his enemies. A fresh Turkish army, numbering between 200,000 and 300,000, came, at the head of which was the Pasha of Damascus, who had acquired in war the surname of Shaitan, or "the Devil," accompanied by a formidable artillery. Sobieski intrenched himself, with about 10,000 men, between two villages on the banks of the Dniester, and there sustained for twenty days the attacks of the enemy and a continued cannonade. At length, when, on 11th October, 1676, the Polish king issued out of his intrenchments in order to engage with the disproportioned hosts, Shaitan Pasha offered him an honourable peace, which was accepted.

A few years of tranquillity followed—at least external tranquillity, for Poland was seldom, if ever, at peace within herself. But a new storm was gathering to draw out Sobieski's energies. A most formidable army, commanded by the Grand-vizier Kara Mustapha, after sweeping over Hungary, in July, 1683, had invested Vienna, from which the Emperor Leopold and his family fled. The Polish king had no reason to love Austria, but he, as a Christian prince, determined to defend the eastern bulwark of Christendom against the dreaded Ottomans. Having been joined by the Duke of Lorraine and other German princes with their contingents, he at length found himself at the head of 70,000 men. On the morning of 11th September the allied army, reaching the summit of the ridge of the Kahlenberg, which overlooks the Austrian capital, saw the tents of the Ottoman host in the plain below. On the following day Sobieski commenced his attack upon the camp; the Turks made but an ineffectual resistance, and the Polish king remained master of the

whole artillery, baggage and all. He then pursued the Turks into Hungary, where he experienced a check at Parany, but defeated them again at Stigonia, and cleared the whole country of the invaders.

Returning to his own kingdom, he found himself again involved in domestic troubles. Every attempt that he had made for the regeneration of Poland was thwarted by some of the nobles, by means of the veto which the constitution gave to each. In the midst of these anxieties, and tormented by fears of the approaching fall of his country, he died on Corpus Christi Day, 1696. He was a great man, a successful soldier, and an accomplished scholar.

SO'BRAON, a village in Lahore district, Punjab, British India, is situated on the west bank of the Sutlej (Satlaj). Opposite this village, on the east bank of the river, in Ferozpur district, lies the famous battlefield where Sir Hugh (afterwards Lord) Gough gained his decisive victory of 10th February, 1816, which brought to a close the first Sikh War, and led to the occupation of Lahore by a British force. The Sikhs had taken up a strong position on the east side of the Sutlej, protecting the Hariki ford, while their rear rested upon the village of Sobraon. The battle took place on the Ferozpur side, where the Sikhs gallantly held their earthworks until almost their last man had fallen. Comparatively few made their way back across the river. This battle immediately cleared the whole left bank of the Sutlej of the Sikh force, and the victorious army crossed into the Punjab by a bridge of boats opposite Ferozpur, and took possession of Lahore.

SOC'AGE, in its original significance, according to Braeton, Littleton, and others, is service rendered by a tenant to his lord by the *soc* (soke), i. e. p^loughshare. The term was afterwards extended to all services rendered which were of non-military character, and were fixed. The certainty of the services distinguished socage tenure from tenure in chivalry, or by knight's service, on the one hand, and from tenure in pure villenage by arbitrary service, on the other; and therefore Littleton says, s. 118, "A man may hold of his lord by **FEALTY** only; and such tenure is a tenure in socage; for every tenure which is not a tenure in chivalry is a tenure in socage."

Socage is said by old writers to be of three kinds: socage in frank tenure, socage in ancient tenure, and socage in base tenure. The second and third kinds are now called respectively tenure in ancient demesne and copyhold tenure. The first kind is called free and common socage, to distinguish it from the two others, though as the term socage has long ceased to be applied to the two latter, "socage" and "free and common socage" now mean the same thing.

By the 12 Car. II. c. 24, the provisions of which were extended to Ireland by the Irish Act of 14 & 15 Car. II. c. 19, tenure by knight's service was abolished, and all lands were directed to be held in free and common socage, which, with the limited exception in favour of lands held in frankalmoinage, is now the universal tenure of real property throughout England and Ireland and those colonies which have been settled by the English.

It is true that a large portion of the soil of all those countries is held by leaseholders, and in England also by copyholders; but the freehold of the land held by leaseholders and copyholders is in their lords or lessors, who hold that freehold by socage tenures.

SOCIAL WAR, also called the *Marsian* or *Italian War*, lasted from 91 till 89 B.C., and was the most formidable ever carried on in Italy during the dominion of the Romans. It arose from the desire of the Italians to be placed on a footing of equality with the Romans. They contributed to the maintenance of the republic, and a great portion of the Roman armies consisted of them; they accordingly wished to have a share in the administration of the state which they upheld, and for which they were shedding their blood. Attempts to bestow the fran-

chise upon the Italians had been made by C. Gracchus and M. Fulvius, but their hopes had been disappointed by the Roman aristocracy. During the period preceding the outbreak of the Social War, several distinguished Italians had taken up their abode at Rome, and had exercised the Roman franchise, and the Romans had connived at, and tacitly recognized their citizenship. But just at the time when the Italians began loudly to demand the franchise, the consuls L. Licinius Crassus and Q. Mucius Scævola, the pontifex (95 B.C.), carried the Lex Licinia Mucia, which enacted that all those who had illegally exercised the Roman franchise should quit Rome. This act created great exasperation among the Italians, though they still hoped that their claims might be granted in a peaceful way. Four years passed without anything being done, until in 91 B.C. the tribune Livius Drusus renewed the attempt of Gracchus and Fulvius; but he was assassinated before he had attained his object. Immediately after this act of violence another law (Lex Varia) was carried by the tribune Q. Varius, which enacted that all those should be prosecuted who had either publicly or secretly supported the claims of the Italian allies. The Italians now took up arms, as they had no other hope; and a confederacy was formed among the Picentini, Sestini, Marsi, Peligni, Marrucini, Samnites, and Lucani. The events of this war are but imperfectly known from the fragmentary notices of the ancient writers. The object of the Italians was to overthrow the supremacy of Rome, and they seemed at one time to have a fair chance of accomplishing their design. The Etruscans and Umbrians at first joined the confederates, but were soon reconciled to Rome. In B.C. 90 the Romans, being in great difficulties, devised an admirable plan for strengthening themselves by the Lex Julia de Civitate, B.C. 90, which conferred the Roman franchise (Romana Civitas) upon all the Latins and Socii who had remained faithful to Rome. Upon these new citizens she could now place full dependence, and her armies were strengthened by them. The first signal victory which they gained was in 89 B.C., under the consul Cn. Pompeius Strabo, who defeated 70,000 Italians at Asculum, which was destroyed. After other advantages gained by the Romans, several of the confederates deserted the common cause, and concluded separate treaties, until at last the Samnites and Lucanians alone carried on the war. At last the Romans promised the franchise to all who would lay down their arms. The offer was accepted by all, with the exception of the Samnites, who were resolved either to conquer or to perish, and who, in the civil war which soon ensued, joined the party of Marius. The result was that Rome, notwithstanding the reverses of the Italians, was compelled to grant what she had obstinately refused; but this refusal cost her and Italy the flower of their population, for nearly 300,000 lives were lost during these fatal two years, many towns were destroyed, and many districts laid waste which never recovered their former prosperity. The Marsi being *socii* of the Romans, the war was called the Social War.

SOCIALISM. The meaning of the word socialism, as M. Janet remarks in his work "*Les Origines du Socialisme Contemporain*," is not easy to define. Indeed, M. de Laveleye, another eminent writer on the subject, says, in his "*Socialism of To-day*," "I have never met with either a clear definition or even a precise description of the word." Proudhon, after "the days of June," in 1848, said to the magistrate who examined him, that socialism "is every aspiration towards the improvement of society." This definition, if such it can be called, is far too wide. The term might with more precision be applied to doctrines concerning social reform which in any way attack the principle of private property. But governments have, in all ages, reserved to themselves the right of modifying and restricting the use of property, notably as regards the right

of bequest, so that such a definition would not be satisfactory either. Without presuming to supply the want, we intend, however, for the purposes of this article, to limit the use of the term to the proposals for a new order of things under which, by the action of the law or the state, the existing rights of individuals as regards property would be more or less completely merged in those of the community or state, as a whole, and a greater equality of social conditions brought about.

Philosophers like Sokrates ("The Republic") in ancient times; Sir Thomas More in his famous "Utopia" (1516); Campanella in the "Civitas Solis" (1623); Bacon in his "New Atlantis" (1629); Harrington in "Oceana" (1656)—which Hume described as the most valuable model of a commonwealth hitherto offered—have anticipated most of the suggestions put forward by modern socialism. And religious enthusiasts belonging to most of the great religions of the world have, down to the present day, founded and maintained numerous societies, monastic or otherwise, in which community of goods has been observed. During the Reformation period a communistic tendency was widespread in Germany, and led to a terrible revolt of serfs against their lords, known as the Peasants' War, which was marked by savage cruelty on both sides. Our English annals also bear traces of somewhat similar though less formidable risings. But these were more the blind movements of rage and despair than deliberate attempts to bring about a reconstruction of society, and it may be safely said that it is only within the last 100 years that socialist principles have emerged from the closet of the student to become the work-a-day creed of thousands; and for the first time in history, except perhaps in ancient Sparta, have thoughtful men seriously proposed to reorganize society at large on socialist lines, and make the state the universal employer and rewarder of labour.

The limited space at our disposal will only enable us to give a brief sketch of the rise and development of this modern socialism, and to indicate the materials from which a knowledge of this important and interesting subject can be obtained.

As M. Janet has shown, the germs of nineteenth-century socialism are to be found in the writings of Jean-Jacques Rousseau and his followers in the eighteenth century. When Rousseau, in his "*Discours sur l'inégalité*," wrote: "The first who, having inclosed a piece of land, took upon himself to say, 'This is mine,' was the true founder of civil society. From what crimes and miseries and horrors that man would have saved the human race who, tearing up the stakes and filling up the ditches, had cried to his fellows: 'Beware of listening to this impostor! You are lost if you forget that the fruits belong to every one, and that the earth belongs to no one.'" There was much of rhetorical exaggeration in Rousseau's language, as is shown by the context; but without perhaps knowing it, he gave expression to the great fund of bitterness and hate which had been accumulating in the hearts of the poor through ages of oppression and wrong, and his words have since furnished a favourite text for socialist agitators. The Abbé Mably, a disciple of Rousseau, was the first to deliberately adopt and defend this view of the mischiefs following from the principle of private property. Another writer of the same period, Morelly, in his "*Code de la Nature*," a work directly advocating the establishment of communism, also suggests the idea, worked out much more fully by Charles Fourier, of accommodating social arrangements to the human passions in such a way as to make it impossible to be wicked. M. Janet has little difficulty in showing that in the main the French Revolution, far from being socialist, established upon a broader and firmer basis the principle of private property. It must be admitted, however, that the natural aspiration for greater equality of social conditions which always attends an approach to equality in civil rights found eloquent

expression in the speeches of most of the leaders. Under the Directory, Babeuf, an obscure newspaper-writer, sketched out a mad scheme for an equal division of property, and formed a conspiracy, among the many restless and disappointed spirits of the time, for completing the revolution, as he called it, by one last great stroke—the abolition of private property. His plot was, however, betrayed to the government, and he and his principal accomplices were seized before a blow had been struck. After a long trial Babeuf and another were condemned to death, and several others to banishment.

Meanwhile Robert Owen, the founder of English Socialism [see OWEN, ROBERT], was preparing to enter upon the work of social reform in a very different spirit. "Like most men of the time," says an American critic, "he looked upon society as a manufactured product, and not as an organism endowed with imperishable vitality and power of growth." Owen's fundamental axiom was that man is entirely the creature of his environment, and therefore not responsible for virtue or vice; while by placing him amidst the proper conditions he may be made perfect. He attributed all the evils of society to priests and politicians, whose annihilation would, he conceived, be speedily followed by universal happiness. An experiment inspired by such ideas could hardly have been a success under the most favourable conditions. But Owen's famous attempt at New Harmony (Indiana), in 1825, was not made under favourable conditions. His rejection of all religion prevented him from drawing the best class of the country into his scheme, and a public invitation to "the industrious and well-disposed of all nations," without any sort of selection, was not the way to gather together a society qualified to successfully carry out a communistic experiment. As Mr. Noyes says in his "History of American Socialism," "The socialistic theorists all assume that association is a step in advance of civilization. If that is true we must assume also that the most advanced class of civilization is that which must take the first step; and a discrimination of some sort will be required to get that class into the work, and shut out the barbarians who would hinder it." An account of one of the non-religious socialist communities would, with slight variations, serve as a history of all—Owenite, Fourierite, or what not. In the work above quoted Mr. Noyes prints an interesting sketch of the Yellow Springs community by an anonymous writer who had been one of its members, some passages of which we quote. He describes how "for the first few weeks all entered into the new system with a will. Service was the order of the day. Ministers of the gospel guided the plough; called the swine to their corn instead of sinners to repentance; and let patience have her perfect work over an unruly yoke of oxen. Ladies who had seldom seen the inside of their own kitchens went into that of the common eating-house and made themselves useful among pots and kettles." "It was in the social atmosphere of the community that the first cloud arose. Self-love was a spirit which would not be exorcised," and in three months the leaders of the community had to acknowledge "that social equality was a failure." "Community of goods" soon proved to be a failure likewise. "The industrious, the skilful, and the strong saw the products of their labour enjoyed by the indolent, the unskilled, and the improvident; and self-love rose against benevolence. A band of musicians insisted that their brassy harmony was as necessary to the common happiness as bread and meat, and declined to enter the harvest-field or the workshop. A lecturer upon natural science insisted upon talking only while others worked. Mechanics whose day's labour brought 2 dollars into the common stock insisted that they should, in justice, work only half as long as the agriculturist whose day's work brought but one." In short, the desire for individual happiness proved as strong within the community as with-

out it, and in less than a year had sent its members back again to the selfish world from which they had in vain sought to escape.

In the same year (1825), but shortly before Owen's own experiment at New Harmony, to which we have already referred, Abram Combe, one of his disciples, started a community at Orbiston, near Glasgow, and the Yellow Springs settlement was made under Owenite influence. In less than two years all three were abandoned, and Owen, having spent much of his fortune at New Harmony, returned to England, impoverished but undaunted, to renew his propaganda. One or two further attempts to carry out his ideas were made in England and Ireland, and several in America, but of all the same story of disunion, financial difficulties, and final break-up, after a few months or years, has to be told.

About the time when Owen began his movement in this country grand but vague schemes for the reorganization of society were also being put forward in France by St. Simon. Claude H. Comte de St. Simon was born in 1760, and belonged to a branch of the famous family of that name. A curious mixture of vanity and originality early showed itself in him. When only seventeen he instructed his servant to awake him every morning with the reminder that he had great things to do. At nineteen he commanded a company in the expedition sent out to help the American colonists in their struggle with England, and gained some distinction. In a few years he left the army to devote himself to the study of civilization, with a view to introducing the greatest improvements possible. He took no active part in politics during the Revolution, but in partnership with a Prussian baron made speculative investments in the spoils of the nobles—the clergy. Although his noble birth was a sufficient excuse for his imprisonment during the Terror, and almost brought him to the guillotine, he succeeded in amassing a tolerable fortune, most of which he spent in endeavouring to equip himself for the great work of devising a new scheme of society. He first kept open house to professors and other learned men, and so contrived to pick up a considerable smattering of science. He afterwards travelled in England, Germany, and Switzerland. Marriage also formed one of the features in this work of self-culture, and ended unhappily in a divorce by mutual consent in less than a year. He then proposed to Madame de Staël, but without success. Extravagance and dissipation soon swallowed up the remainder of his fortune, and St. Simon was reduced to such straits that he was glad to get employment as a copyist in a *mont-de-piété* at Paris, with a salary of 1000 francs a year. He produced several unimportant works of a semi-scientific character at intervals from 1803, and in 1811, with the aid of Augustin Thierry, one of his few disciples, wrote "Réorganisation de la Société européenne." This was followed by numerous other writings, mostly of a fugitive and ephemeral character, but including "Parabole" (1819), in which he declared, with much audacity, that the effect produced by the loss of the king, all the royal family, and all the ministers of state would be trifling compared with the disaster that the deaths of a like number of the leaders of science and manufactures would inflict upon the country. For this he was prosecuted, but acquitted. In 1818 his health had completely broken down under the privations and disappointments he endured, and he was in the direst straits when an old employé of his in revolutionary times, named Diard, came to the rescue, took him into his house and maintained him at his work for two years, when the death of his benefactor again left St. Simon without resource. In 1820, however, he produced "L'Industrie," written in conjunction with Auguste Comte and A. Thierry, and a "Catechisme des Industriels" in 1822-23. Still none of his books were successful, and he had great difficulty in getting them published. In 1823, overwhelmed by poverty, ill-health,

and want of success, he attempted suicide by shooting himself. He escaped, however, with the loss of an eye, and lived to write his principal work, "Nouveau Christianisme." He died at Paris in May, 1825, still full of schemes for the dissemination of his ideas, and full of confidence in their ultimate adoption. "A blind superstition," said he, "has placed the golden age of humanity in the past, while it really lies in the future." Although his teachings are vague and confused as to details, the leading ideas are clear enough. He considered the industrial chiefs of society to be its natural and appropriate rulers, the final end of social activity being, as he said, the "exploitation of the world by association." In the "Nouveau Christianisme" St. Simon endeavours to reduce Christianity to its simple and essential elements, and seized upon the great precept of Jesus—"love thy neighbour as thyself"—which he wished to make the leading principle in the reorganization of society. A small sect of St. Simonians was formed in Paris after his death, and made a great sensation for a time. They, however, developed many extravagant notions, especially in regard to the position of women and the relations of the sexes, and founded a sort of fantastic sacerdotalism. A community, started by Enfantin, at Menilmontant, soon came to an ignominious end. The leaders were tried and condemned for proceedings prejudicial to social order, and in 1832 the sect entirely broke up. St. Simon's influence on the thought of the age must not be estimated by the ridiculous failure of his professed followers. His idea that society should be the owner of all the instruments of production, and intrust to social groups and social functionaries the management of the various properties, is one of the leading principles of the aggressive socialism of to-day. The mere fact, too, of his having numbered among his disciples men afterwards so famous as Auguste Comte the philosopher, Augustin Thierry the historian, and Michel Chevalier the political economist, is alone sufficient to rescue his name from oblivion.

Another prominent French socialist leader, Charles Fourier, had been engaged in working out his ideas at the same time as St. Simon [see FOURIER, CHARLES], and in 1822 published them in an elaborate work entitled "Traité d'Association domestique agricole." Fourier saw what his predecessors had not, that society is a growth, and not a construction; but he lost himself in magnificent speculations as to the formation and propagation of worlds, and the future destinies of man, who, according to him, is to attain an average height of 7 feet, with a proportionate increase of intellectual power, and to live 144 years. In his scheme of ideal communities, called *phalanxes*, to consist of 1800 persons, divided into groups as sympathies and tastes may guide, and all living in a common home, the *phalansterie*, Fourier relies upon the sensual passions as the motive power to maintain human activity, but he omitted to take into account one of the strongest of them—indolence. Fourierism found its principal field for experiment in the United States. It was preceded by the well-known Brook Farm community, founded in 1811, under the direct inspiration of the famous Unitarian preacher Dr. Channing, as an effort towards establishing the kingdom of God upon earth. The Hopedale community was also started in the following year by the Universalists on very similar lines to Brook Farm. The masterpiece of Hawthorne, the "Blithedale Romance" (while purely a romance), is founded on the great novelist's personal memories of Brook Farm, and is invaluable as showing at once the spirit of the movement and its weakness. In the soil thus prepared Fourierism, which was introduced into America by Albert Brisbane and Horace Greeley in 1842, soon struck root and produced a far wider and more enthusiastic movement than the Owenite one. From twenty to thirty phalanxes and other similar communities were founded under its inspiration in the next few years. Like the

Owenite societies they usually took up large quantities of land in thinly settled parts of the country, and devoted their energies mainly to agriculture, though a saw-mill generally figures in the records of these societies, and often as one of the most important sources of income. Their fate, though not quite so speedy, was at last the same as that of their predecessors, and in ten or twelve years internal dissensions had made an end of them all.

These earlier philanthropic and experimental forms of socialism, then, have been put to the trial and condemned unequivocally. The test of practical experience has been applied as their promoters desired, and, like the touch of Ithuriel's spear, it revealed them in their true character, as generous dreams, which may, in the dim and distant future, perhaps, be to some extent realized, but utterly unsuited to the men and women of the age to which they were introduced with such high hopes. The adverse verdict has been fatal, and Owenism, St. Simonism, and Fourierism are now not only dead, but almost forgotten, except by what one may call social antiquaries. We must not omit to mention, however, some other proposals of a more moderate, if not yet practicable nature, which were put forward about this time. Louis Blanc strongly believed in national workshops, and when the revolution of 1848 occurred he prevailed upon the provisional government, of which he was a member, to put the plan into practice. Numbers of workshops were set up in Paris, and many thousands of labourers engaged, but confusion and mismanagement soon followed, and the experiment was abandoned. At the same period the Constituent Assembly voted a subsidy of 3,000,000 francs to encourage the formation of working men's associations, as it was commonly supposed that a supply of capital alone was needed to enable productive societies of workmen to compete successfully with production under the existing system. In Paris thirty associations, twenty-seven of which were composed of working men, comprising in all 434 associates, received 890,500 francs. Their history is very instructive. Within six months three of the associations failed, and there were many changes of managers. By July, 1851, eighteen associations had vanished, in less than another year twelve more had gone, and in 1875 but one was left.

Proudhon, another prominent socialist of the time, unlike Louis Blanc, wanted to carry out his reforms without state aid, and started, in 1849, the *banque du peuple*, an association of 20,000 workmen, pledged to take its notes as money. The main idea of the institution was to bring the means of obtaining credit within reach of all, and the bank advanced four-fifths of the value of articles deposited with it, in its own notes, without interest. The experiment, however, was soon stopped by the government, who suppressed the bank on the ground of its violation of the laws of trade.

Meanwhile, however, another more vigorous and widespread variety of socialism has grown up. From the time when the French Revolution shattered the already tottering structure of feudalism there has been in every country of Europe a steady movement towards political equality and democratic government. At the same time, a movement in the opposite direction has been taking place in the industrial world. The rapid growth of capital, and the marvellous progress of invention, have very greatly increased the productive power of labour, and enormously improved the means of inter-communication. These changes have tended to supersede what one may perhaps call the domestic production of earlier times, when the transition from employé to employer was easy and common, by a system of capitalistic production on a large scale, and by means of what have been called industrial armies, in which the ordinary workman has no more chance of changing his condition than the private soldier has of obtaining the marshal's baton.

"The much-vexed wages question," says M. Laveleye, aggravated, we venture to add, by the uncertainty of employment resulting from the exceedingly complex and sensitive organization of modern industry, "gives to socialism the character of an acute inflammatory disease. Formerly wages were regulated by custom, and often even by official tariff." To-day they are fixed by competition. "Hence the law of Ricardo, that 'iron law,' as the German socialists term it, in accordance with which wages tend to decrease to that fatal point which permits the workman merely to live and perpetuate his kind, comes too often into operation. [For fuller discussion of this question see *WAGES*.] As soon as this law, formulated by economists, began to be understood by working men, they said, 'Since our wages depend upon the supply of our labour, let us cease to work until we get higher wages.' Hence those strikes and coalitions on the Continent, in America, and especially in England, which almost daily interrupt work and interfere with every trade. Masters and men are in a state of constant warfare, having their battles, their victories, and their defeats. It is a dark and bitter civil war, wherein he wins who can hold out longest without earning anything; a struggle far more cruel and more keen than that decided by bullets from a barricade; one where all the furniture is pawned or sold, where the savings of better times are gradually devoured, and where at last famine and misery besiege the home, and oblige the wife and little ones to cry for mercy."

History shows that inequality of conditions has ever been the greatest peril of democracies from the old Greek republics downwards, and the march of democratic principles in our times has brought modern society face to face with the same danger. "For centuries," as Taine says, "belief and obedience were an inheritance;" the existing social organization was regarded as almost divine, a thing against which it were alike vain and impious to rebel. But the Revolution, with its watchword of equality, has changed all that, and as political equality is more nearly attained, the demand for social equality grows louder and more urgent. Present-day socialists look entirely to state transformation for social regeneration. They are politicians and revolutionists. The general aim of the socialists with whom the statesmen of Europe have now to deal, is to establish a democracy of labour, "a state," as Mr. Rae says, "in which power and property shall be based on labour; where citizenship shall depend on a labour qualification instead of a qualification of birth or of property; where there shall be no citizen who enjoys without labouring, and no citizen who labours without enjoying; where every one who is able to work shall have employment, and every one who has wrought shall retain the whole produce of his labour." In order to bring about this state of things the land of the country and all instruments of production must become the property of the community, and all industrial operations must be placed under the direct administration of the state. This form of socialism originated, as we shall see, in Germany, and its remarkable extension of the duties of the state becomes less astonishing when we find that the Prussian civil code, as quoted by M. Laveleye, already contains such socialistic provisions as the following:—

"To those who cannot find employment work shall be assigned suitable to their strength and ability."

"Those who, from indolence or taste for idleness, or from any other vicious disposition, neglect to provide themselves with the means of subsistence, shall be obliged to execute useful works under surveillance."

"The state has the right, and is obliged to create institutions for restraining at once both pauperism and prodigality."

While French socialism was active and sanguine it met with little or no sympathy in Germany, and it is only since the revolutionary period of 1848 that the new and more

scientific form of socialism has grown up in that country and gradually spread into others, including England. The first important work on the subject in Germany was the "Investigations on the Organization of Labour," written by Professor Winkelblech under the *nom de guerre* of Carl Marlo, and left unfinished at his death in 1859. He condemned what he called the pagan principle of sacrificing the masses to the interests of the few, on which he considered present society to be based, and asserted the right of every man, as such, to property and to the enjoyment of the resources of the earth which God has bestowed upon mankind. He condemned exclusive ownership of natural agents of any kind as tending to deprive new-comers of their legitimate inheritance, and advocated the conversion of land and the instruments of production into collective property, though each one should have almost unlimited control over the fruits of his own labour. Indeed, by a different route he arrived at much the same conclusions as Karl Marx, undoubtedly the most profound and original thinker that socialism has yet produced. Unlike French socialism, which was inspired, as we have seen, by the extravagant and visionary theories of men like St. Simon and Fourier, the formidable German socialism of to-day "founds its doctrines," as Mr. Rae observes in "Contemporary Socialism," "on a thoroughly scientific investigation of the facts and criticism of the principles of the present industrial régime, and it seeks to carry them out by means of a political organization, growing singularly in strength, and based on the class interests of the great majority of the people." The same authority shows at some length how this socialism is the natural outcome of German philosophy, which passed from the Idealism of Hegel into the Humanism of Feuerbach. Under the influence of this latter many of the young Hegelians or Hegelian Left turned to socialism as the practical application of their views.

Karl Marx certainly belonged to this school. Born at Trèves in 1818, the son of a Christian Jew who held a high post in the civil service, Marx won a considerable reputation at the University of Bonn. He would probably have settled down as a professor but for his radical sympathies, which easily drew him into newspaper warfare, and induced him to take up a political position fatal to his advancement under government. As editor of the *Rhenish Gazette*, he attacked the authorities so boldly and vigorously that the paper was soon suppressed. Marx then went to Paris and continued his attacks on the Prussian government in such papers as were open to him with so much bitterness that they procured his expulsion from France. He then took refuge in Brussels, where he was soon again actively engaged in controversy on political and economic subjects. Marx was always a thoroughgoing believer in the principle of evolution as applied to society, and ridiculed the French socialistic schemes as impracticable utopias, because they ignored the progressive development of society. He told the Communist League (a society founded in Paris in 1836) that "their work could have no tenable theoretical basis except that of a scientific insight into the economical structure of society, and that this ought to be put into a popular form, *not with the view of carrying out any utopian system*, but of promoting among the working classes and other classes a self-conscious participation in the process of historical transformation of society that was taking place under their eyes." The League invited him to attend their General Congress in London in 1847, and there he gained the adoption of the "Manifesto of the Communist Party," which was composed by himself and Engels, and was widely distributed over Europe just before the Revolution of 1848. "This Communist League," observes Mr. Rae, "may be said to be the first organization, and this communist manifesto the first public declaration of the International Social Democracy that now is." In the manifesto society was described as broadly divided into two hostile

sections—the capitalist class and the proletariat; the system of wage-labour was denounced as condemning men to practical slavery; and workmen were urged to strive for political power and use it to supersede the bourgeoisie or capitalist class by the state.

Marx was very active during the revolutionary period of 1848–49, and at its close retired in disappointment to London. After the dissolution of the Communist League in 1852, he quietly continued his literary labours until he again came into prominence in connection with the famous International Working Men's Association. It arose out of a conference between English and French workmen relating to the London Exhibition of 1862, and its original aim was moderate enough. Marx, however, soon gained a paramount influence in its counsels, and under his guidance it took up the work of the defunct Communist League. After a few years it was able to boast an enormous number of members, but it probably never had anything like the unity and cohesion which the fears of its enemies or the boasts of its friends attributed to it. The influence of the society was first exhibited in 1866 in France. In that year a strike of tailors occurred in England, and the English masters offered good terms to French workmen to cross the Channel. The International Society, however, bound to protect the interests of its English members, put its veto on the idea, and compelled the French workmen to decline the offer. On several subsequent occasions, both in England and various countries of Europe, employers who tried during a strike to replace their own workmen by foreign artisans found themselves thwarted by the agents of the International.

The headquarters of the society were established in London, the general council consisting of a secretary-general and fifteen members. Each country formed a branch of the association, and each branch was divided into sections. The insurrection of the Paris Commune in 1871, with which the leaders of the International were at least in sympathy, proved its deathblow. Its more moderate adherents, including most of the English workmen, were alienated by the excesses committed, and the more violent disappointed at its inability to afford material assistance. The break-up was hastened by a quarrel which took place at their congress at the Hague in 1872 between the advocates of centralized political authority for the government of the state of the future, headed by Marx, and the anarchic socialists, led by Bakunin, the founder of Russian Nihilism, who objected to any supreme authority at all, and would have industry conducted on a communistic principle by voluntarily formed groups of workmen, which might or might not adopt some form of federation.

After the collapse of the International Marx ceased to take an active part in political agitation, and devoted the rest of his life to economic studies. He died in London in 1883, and is buried in Highgate Cemetery. His remarkable book, "Das Capital," the first part of which was published in 1867, was translated into English in 1886–87. Mr. Rae, in his "Contemporary Socialism," says of this work: "The 'Das Capital' of Marx may be said to be the sacred book of contemporary socialism, and though, like other sacred books, it is probably a sealed one to the body of the faithful, for it is extremely stiff reading, it is the great source from which socialist agitators draw their inspiration and arguments. Apart from the representative character with which it is thus invested, it must be at once acknowledged to be an able, learned, and important work, founded on diligent research, evincing careful elaboration of materials, much acuteness of logical analysis, and so much solicitude for precision that a special terminology has been invented to secure it." Anything like a detailed analysis of this work would, of course, be quite beyond the scope of such an article as the present. We must therefore content ourselves with indicating some of its leading principles. In

common with Adam Smith, Ricardo, J. B. Say, and other orthodox economists, Marx declares value in exchange to be produced by human labour alone. The price of any commodity represents the average amount of labour required to produce it under the normal industrial conditions of the time. But labour is also a commodity, and to it the same law applies. Its natural price is therefore the average cost of the labour necessary to procure the workman's maintenance at the standard of living of his class at the particular period and in the particular country in question. In this we have also the Ricardian or orthodox economic law of wages. Marx goes on to show that five or six hours' work a day would suffice to produce the commodities necessary to maintain the labourer and his family for a day. And now we come, according to him, to the secret of the accumulation of capital by the robbery of labour. Under the existing system of production the capitalist is able to buy a day's labour, of (say) twelve hours, at the cost of its production, probably only five or six hours. This labour is then applied to the manufacture of articles whose value in exchange is increased by a corresponding amount, for labour has been already described as the sole source of value in exchange. These articles now belong to the capitalist, who pockets the difference between the five or six hours' labour-force represented by the wages he has paid, and the twelve hours' labour-force by which the value in exchange of his commodities has been increased, and the workman is robbed of the exchange value of his labour to exactly the same extent. Marx goes on to contend that the only way to substantially improve the condition of the workman, and to stop this perpetual plunder of labour by the capitalist, is to entirely overturn the present capitalist régime, and socialize the land and all instruments of production—that is, make them the property of the community as a whole, not of individual members. It is important to observe that Marx founds his whole argument on the assumption, derived, as we have said, from the earlier economists, that labour is the sole source and measure of value-in-exchange. He rigidly insists upon this point, although in so doing, as both M. de Laveleye and Mr. Rae have ably shown, he is reduced to great argumentative straits, and not unfrequently landed in obvious absurdities and even contradictions.

The truth is that, as the late Professor Jevons first conclusively showed in his able work on the "Theory of Political Economy," *utility* is the primary source of value, and that *labour* is only a secondary, though important, factor. [See VALUE.] The foundation-stone having thus already crumbled away, it is difficult to see how the disciples of Marx will be able to prevent the ultimate fall of the whole logical structure he so laboriously reared upon it.

We must now turn from the greatest thinker of modern socialism to its greatest apostle—Ferdinand Lassalle. A brief account of his strange and romantic career will be found elsewhere [see LASSALLE, FERDINAND], and we shall only touch here upon his work as an advocate of socialism. He may be said to have practically created the German socialist party of to-day. His first definite statement of socialist views was given in a lecture he delivered in 1862 to a working men's society in Berlin, on "The connection between the Present Epoch of History and the Idea of the Working Class." It brought upon him a government prosecution and imprisonment. Nothing daunted, he, in the following year, at the invitation of a working men's congress at Leipzig, repeated his views in a letter which was published under the title of "The Working Men's Programme," and styled by his friends "The Wittenberg Theses" of the present socialistic movement. In it the question of the emancipation of the working classes is dealt with from the standpoint of the Hegelian philosophy of history. He shows how the bourgeois period, which, in 1789, succeeded to the feudal age, is doomed in

its turn to be replaced by a working-class age. Like Marx, Lassalle is a strong believer in the progressive development of society. "It is impossible," he says (as quoted by Mr. Rae), "to make a revolution; it is possible only to give external legal sanction and effect to a revolution already contained in the actual circumstances of society. . . . To seek to make a revolution is the folly of immature men who have no consideration for the laws of history; and for the same reason it is immature and puerile to try to stem a revolution that has already completed itself in the interior of society."

Lassalle founds his whole attack on the present social system, and those who contend that the working man's position can be improved under it, upon the "iron law of wages," of which we have already spoken. In opposition to Schultze-Delitzsch and the progressive Liberals who had been busy in promoting trades' unions, co-operative stores, savings banks, sick funds, &c., Lassalle said all these were worse than useless. As soon as they had become general the minimum cost of living would be reduced, and as competition always tends to reduce wages to that minimum, the capitalist employer would in the end reap all the benefit. The only real cure, he urged, is co-operative production, the substitution of associated labour for wage-labour, as by that means alone can the effects of the "iron and cruel law of necessary wages" be escaped. At the same time he contended that it was absurd to expect workmen out of their scanty earnings to save enough capital to take part in production on a large scale, which the conditions of modern industry demand. The state should advance the capital for this purpose. It does so to start railways, to develop agriculture, &c.; and might do it with more reason in this case, since the great working class (96 per cent. of the population) are, in fact, not a class, but the state itself. Lassalle saw clearly enough that the first step must be to obtain political power for the working classes, and on 23rd May, 1863, he founded the General Working Men's Association for the promotion of universal suffrage by peaceful agitation. He worked at the cause by means of the press with marvellous energy and enthusiasm. He traversed the country in all directions, making speeches and establishing branches. But the German workmen remained unmoved, and after three months of strenuous exertion a poor 1000 members only were enrolled. Disappointed, but not disheartened, he still toiled on for another year, and then, finding the numbers still under 5000, he gave up the task in despair. His sudden and tragical death on 31st August, 1864, strange to say, gave a fresh impulse to the movement. His followers appear to have been taught that he was not dead, but only translated, and would again come to lend them. Anyhow his teachings took root at last, and large numbers of workmen became ardent converts.

Lassalle, although content to accept state-aided co-operative production as an instalment, looked forward to a complete transformation of present industrial arrangements. "We have a system of socialism now," he says, "but it is anarchic and hopelessly unjust, and should be replaced by a regulated and rational system." His teachings are very much akin to those of Karl Marx, and the main distinction between them is the more moderate and thoroughly national spirit which Lassalle showed throughout his career as a socialist. Prince Bismarck lent a willing ear to some of Lassalle's schemes for state aid to working men, and has often avowed his sympathy with them. His attempts at socialistic legislation, however, have quite failed to conciliate the socialists. Bishop Ketteler of Mayence, too, came under the influence of Lassalle, and devoted himself with great ardour to founding the Catholic socialist party, now very strong, which, according to M. de Laveleye, teaches "the ideas of Marx and Lassalle, invested with a slight Catholic varnish," and has "gained the adhesion of two very numerous classes"—the smaller rural proprietors and the Catho-

lic peasantry of South Germany—"that the social democrats were unable to reach."

The league founded by Lassalle received a great impetus on the extension of the suffrage in 1866, but dissensions arose over the question of joining the International and accepting its programme. In 1869 Liebknecht and Bebel were expelled from the league, and in the following year founded the Social Democratic Labour Party. Both sections joined in condemning the prosecution of the war against France after the republic had been formed, and also the constitution of the German Empire. This unpatriotic conduct Prince Bismarck never forgot, and when the two parties, which had united in 1874, polled, in 1877, nearly 500,000 votes, he took alarm, and after the attempts on the emperor's life by Hoedel and Nobiling, caused repressive measures to be taken by the government. A state of siege was declared in Berlin, newspapers were suppressed, meetings forbidden, and the socialist leaders either exiled or placed under surveillance. These measures were renewed in 1881, and the strength of the movement can now be only very imperfectly estimated.

In America there has been also a rapid spread of socialism, but that has been due to German immigration—very few native-born Americans become converts. The doctrines of socialism imported from Prussia were eagerly listened to in Austria. In 1869, however, when 100,000 men appeared at the doors of the Reich-rath demanding full liberty of meeting, association, and printing, repressive measures were adopted, and little has been since heard of the movement. Socialistic ideas are rife among the workmen of the towns in France, but the movement has taken no very definite shape since the suppression of the communist insurrection in 1871. Socialism is said to be gaining strength in Belgium, Holland, and Denmark, while in Spain and Italy its adherents are both numerous and extreme in their views; in Spain some serious risings have taken place. In Germany the title of socialist has been given to a number of groups and organizations which are not, strictly speaking, socialist, such as the Conservative Socialists, the Evangelical or State Socialists (founded by Herr Stöcker, the court preacher), and the Professional Socialists or Socialists of the Chair (Katheder-Socialisten); their object is rather social reform than reconstruction, and many of their proposals have already been adopted in this country.

In England the co-operative movement, which had its origin about 1840, may perhaps be considered the only real fruit of Owen's long agitation. A detailed account of it will be found under CO-OPERATION. There is a Christian socialism in this country which originated in 1848 when Charles Kingsley, Maurice, and others started the *Christian Socialist* newspaper, and devoted themselves to promoting the co-operative movement. The Christian socialism of to-day seems to have come to some extent under the influence of Marx and Lassalle, and is represented by the Guild of St. Matthew. We have also one item of the socialist programme embodied to some extent in the societies formed under different names to promote the nationalization of the land. But in spite of the eloquence of Mr. George's "Progress and Poverty," and the ingenious scheme put forward by Mr. Wallace, the celebrated naturalist, in his "Land Nationalization, its Necessity and its Aims," the movement seems to make but little progress.

An offshoot of German socialism has been planted in this country by Mr. William Morris, the famous poet and decorative artist, Mr. Hyndman, Miss Helen Taylor, and others. Its three or four short years of existence have been disturbed by much internal dissension, which led, in 1886, to a split between the moderate and extreme sections. Although a noisy and persistent agitation has been carried on, the revolutionary socialism taught appears to have made little impression upon the great mass of English workmen.

("Les Origines du Socialisme Contemporain," P. Janet,

Paris, 1883; "Contemporary Socialism," J. Rae, M.A., London, 1881; "History of American Socialisms," J. H. Noyes, London, 1870; "Das Capital," Karl Marx, 1887; "Socialisme Contemporain," E. de Laveleye — English translation, "Socialism of To-day," with a chapter on Socialism in England, by G. H. Orpen; Hyndman's "Scientific Basis of Socialism.")

SOCIETY ISLANDS, the name given by Captain Cook, in honour of the Royal Society of London, which had fitted out his expedition of discovery in 1769, to a cluster of islands in the South Pacific Ocean. They lie about 70 miles westward of another group, formerly named the Georgian Islands, in honour of George III., and of which Tahiti (Otaheite) is the chief. Mariners usually call the latter the Windward and the former the Leeward Islands. The islands are now under French protection. The following are the names of these islands:—Maitia, TAHITI, Eimeo, Maiaoiti, Tetuaroa, Otaha, Manua, Tuba, Lord Howe's Island, and Seilly Island. Huahine, Raiatea, and Borabora are independent. The list is exclusive of several islets which surround or are interspersed among those enumerated. The estimated area of the whole is 580 square miles, and the population 14,000. The trade of the islands has largely increased of late years, and the imports and exports now amount to £220,000 annually.

The islands are all mountainous in the interior, and have a border from 1 to 4 miles wide of rich level land, extending from the base of the high land to the sea, and although the outline of each has some peculiarity distinguishing it from the rest, in their general appearance they resemble each other. Tetuaroa, Tuba, Lord Howe's Island, and Seilly Island, however, form exceptions, as they are of coral formation, and very low, seldom rising many feet above the sea. A corresponding resemblance prevails in the geological structure of the principal clusters and surrounding islands, the component substances being the same in all. There seems no reason to suppose that any of these islands are altogether of volcanic origin, like the Sandwich Islands, though they contain basalt, whinstone, and earthy lava. All of them are surrounded by a belt of coral reef, from 2 or 3 to 20 yards in width, and situated at distances from a few yards to 2 miles from the shore; these reefs protect the coasts from the action of the rolling waves. The soil is various. The sides of the mountains are frequently covered with a thin layer of light earth, but the summits of many of the inferior hills present a thick stratum of stiff red ochre or yellow marl. The level tracts along the coast are the most valuable parts of the land, the soil there being a rich alluvial deposit, with a considerable admixture of vegetable mould, which is exceedingly prolific.

The products, character, and condition of the inhabitants of these islands are the same as those of Tahiti. The islands are watered by numerous streams, and the climate is generally mild and healthy.

The Society Islanders are generally above the middle stature, but their limbs are much less muscular and firm than those of the natives of the Sandwich Islands. The prevailing complexion is an olive, a bronze, or a reddish-brown. They belong to the Malay race, are affable, ingenious, and hospitable, but volatile and sensual. The habits and dress of Europe are usually prevail. Numerous vessels of from 30 to 80 tons burden are employed in trade and in maintaining an intercourse between the several islands. A press has for many years been employed in supplying the natives with publications in their own language, suited to their wants and condition. Christianity has been generally adopted, and the population is increasing. Most of the natives, owing to the exertions of the missionaries, first sent out by the London Missionary Society in 1797, can now read and write. Some Roman Catholic priests also commenced a mission in the islands

about thirty years ago, a proceeding which led to disputes between them and the Protestant missionaries. In September, 1843, Queen Pomare was compelled, by the intrigues of the former, to put herself under French protection. In the following month she retracted, at the instigation, it was said, of the English consul, Mr. Prichard. Tahiti and the neighbouring islands were then taken possession of by Admiral Du Petit Thouars, November, 1843, and in March, 1844, Mr. Prichard was imprisoned. This event nearly gave rise to a rupture between England and France; but the French government made some amends by censuring the violent conduct of their admiral. They did not, however, withdraw their forces from the islands, which still remain under French protection, and are really a French colonial settlement.

SOCI'NUS, FAUSTUS, nephew of Lælius Socinus, was born at Siena, 5th December, 1539. His father, Alexander Socinus, was for some years professor in Padua, but died early, and the young Faustus was left to the care of one of his uncles, who allowed him to grow up with a very imperfect education. At the age of twenty he made himself obnoxious to the ecclesiastical authorities by his inquiring spirit, and was compelled to seek safety abroad. After the death of his uncle, whose property and manuscripts he inherited, he returned to Italy, and being taken into the service of the Grand-duke of Tuscany, he spent twelve years at the court of Florence. At the end of this period, however, he resolved to devote himself to the work of a religious reformer, and in 1574 he moved to Basel to study theology. Here he remained three years, during which he wrote his treatise "De Servatore," and from thence he went to Transylvania, and in 1579 to Poland, where the anti-Trinitarian party had gained a strong foothold. Here, however, his moderate opinions caused him to be coldly received, but in spite of this he wrote in defence of the anti-Trinitarian churches, and also published his treatise, entitled, "Pro Racoviensibus Responsio," in reply to a work of Jacobus Palaeologus. His book was misrepresented to the King of Poland, and Faustus found it necessary to retire from Cracow, where he had lived four years, to the estate of a nobleman named Christopher Morszyn. During this retreat he married the daughter of his protector, and this circumstance enabled him to gain many converts from the noble and wealthy classes. But his wife died in 1587, and he then returned to Cracow overwhelmed with grief. He was present at the synod of Brest held in 1588, and took a leading part in the discussions, and he appears about this time to have gained over many persons of rank and influence to his opinions. But after a time public opinion was roused against him, his lands in Italy were confiscated, and he was dragged half naked from his sick-chamber by the rabble, and exposed in the market-place, his house being plundered and his manuscripts destroyed. After this outrage he left Cracow for the neighbouring village of Luclavie, where he died, 3rd March, 1604. Faustus Socinus was eloquent, conciliatory, moderate, and a man of fine tone, temper, and conduct. His works, contained in the first two volumes of the "Bibliotheca Fratrum Polonorum," consist of theological tracts, expositions of Scripture, and polemical treatises, with a great number of letters. Many of his unpublished letters are preserved in the library of Siena.

Though Socinus was the founder of a school in theology, his influence was rather negative than positive. He denied the doctrine of the Trinity, the deity of Christ, the personality of the devil, the doctrine of inherited depravity, the vicarious atonement, and the eternity of punishment. His theory was that Jesus was a man divinely commissioned, who had no existence before he was conceived by the Virgin Mary; that human sin was the imitation of Adam's sin, and that human salvation was the imitation and adoption of the virtue of Jesus; that the Bible was to be in-

terpreted by human reason, and that its metaphors were not to be taken literally. The name Socinian, which is often employed as a term of reproach, was for a century the honourable designation of a powerful and numerous religious body in Poland, Hungary, and Transylvania, and at the present day the Racovian catechism (so called from the place of its publication, Rakow, in Poland), compiled chiefly from the writings of Socinus, is still the text-book of faith and worship in many Hungarian and Transylvanian churches. An English translation of this catechism appeared at Amsterdam in 1652, and in 1819 the Rev. Thomas Rees published a new translation, with a historical notice. The life of Faustus Socinus was written by the Pole, Przypcow, and by the Rev. Joshua Toulmin (8vo, London, 1777).

SOCINUS, LÆLIUS, an Italian theologian, and uncle of Faustus Socinus, was born in Siena, in 1525, and died in Zurich, 16th March, 1562. He came of a good family, and in early life turned his attention to the study of theology. In 1547 he left Italy, and after travelling through Poland, Germany, and Switzerland, he finally settled at Zurich. He enjoyed the friendship of Melancthon at Wittenberg, and that of Calvin at Geneva, and although his opinions were at variance with the views of the reformers, he does not appear to have made any attempt to promulgate them publicly. He was the author of a few tracts, however, some of which are published in the "Bibliotheca Fratrum Polonorum," and he made his views known to his relatives and friends by means of letters. His life was written in Latin by Ilgen (8vo, Leipzig, 1814).

SOCIOLOGY, the science (or group of sciences) that treats of the development of human society, including the moral, political, antiquarian, and economical standpoints. In the present work these have been treated by preference in separate articles.

SOCK AND BUSKIN (Lat. *soccus* and *cothurnus* respectively), the well-known boot-symbols of comedy and tragedy.

The *soccus* was a kind of slipper or low shoe, fitting loosely, and special to comic actors of broad farcical parts.

The *cothurnus* (Gr. *kothornos*), which we translate buskin, was a high boot, rising to the middle of the calf; and when worn by tragic actors was thickened out with cork so as to make a very thick sole, and thus to elevate the actor and add an imposing stature to his stage attributes. The *cothurnus* (of course with an ordinary sole) was the favourite foot-gear of the huntress-goddess Artemis.

SOLE, in architecture, a plain block or plinth forming a low pedestal to a column, or a plinth at the foot of a wall.

SOCOTRA, an island in the Indian Ocean, situated about 150 miles from Cape Guardafui, the most eastern point of Africa. It extends about 82 miles from west to east, with an average width of 16 miles. The area is estimated at 1520 square miles, and the population between 3000 and 4000, mostly Bedouins, with some settled Arabs, negroes, and descendants of Portuguese. The centre of the island is a chain of granite and limestone mountains, rising to 5000 feet in height, around which a belt of low land, from 2 to 4 miles across, skirts the sea. The north side of the island is fertile. The inhabitants are obliged to collect rain-water in reservoirs. In most parts of the northern plain, however, water is found at a depth of from 8 to 10 feet below the surface. The climate is sultry, but more temperate than on the continent. The products comprise aloe of the finest quality (for which the island has been famous from the earliest period), dragon's blood and other gums, tamarinds, tobacco, dates, a kind of millet, and ghee. The domestic animals are oxen, sheep, goats, camels, and civet cats. The trade is mostly with Muscat, whence provisions are imported.

There is no place which can be called a town. The capital is Tamarida, which is built not far from the

northern shores, and consists of about 150 straggling houses.

Socotra was known to Ptolemy and to Arrian; was visited by the Portuguese Fernandez Perara in 1504, and taken possession of by Albuquerque in 1507. It is not known at what time the Portuguese evacuated the island, but probably before the sixteenth century elapsed, and it has since belonged to the Sultan of Keshin, on the Arabian coast. The British government in 1876 concluded a treaty with the sultan, by which that chief undertook not to cede the island to any foreign power, nor to allow any settlement on it to be made without the consent of the British. The island was visited for botanical purposes by Professor Balfour, of Glasgow, in 1880, and by Dr. Schweinfurth in 1881, and in 1886 it was formally annexed to the United Kingdom by the governor of Aden.

SOCRATES. See **SOKRATES**.

SODA. See **SODIUM**.

SODA WATER, a refreshing drink formed by dissolving carbonate of soda in water, and supersaturating it with carbonic acid under pressure. It is useful in cases of debility of the stomach accompanied with acidity. Ordinary soda water, as generally sold, seldom if ever contains any alkali; it is simply water saturated with carbonic acid gas under considerable pressure, and is a brisk refreshing beverage. It is an article of large and increasing consumption.

SODIUM. This metal, the base of the alkali soda, was discovered by Sir H. Davy in 1807, who obtained it by the electrolysis of the hydrate. In combination with oxygen it is widely distributed throughout nature, combined with chlorine as sodium chloride, or common salt, it is abundant as rock salt in the salt mines and brine springs of Cheshire, also in sea-water and many mineral waters; as sodium nitrate, or soda nitre, it forms the *caliche* of Peru, occurring in enormous deposits. It is also found in the form of carbonate, borate, and sulphate in some lakes, as fluoride in crysolite, and as silicate in an immense number of minerals. It also forms an important constituent, in many different combinations, in all animals and plants, particularly those plants growing near the sea.

Sodium is now prepared on the large scale; it is especially used in the manufacture of aluminum and magnesium, the cost of these useful metals depending mainly on that of sodium. It is prepared by distilling in an iron retort, at a full red heat, a mixture of sodium carbonate, charcoal, and chalk, the latter being added to prevent the fusion of the soda salt; the metal is collected in iron plate receivers under naphtha. No by-products are formed, as in the case of potassium; the whole process is much easier, and the yield better.

The symbol of sodium is Na; the atomic weight is 23. It is a brilliant silver white metal, having a specific gravity of 0.985. At ordinary temperatures it is as soft as wax; it melts at 95.6° C. (204° Fahr.), and distils at a red heat, forming a colourless vapour. It can be obtained in octahedral crystals. It is a good conductor of heat and electricity. It floats on water and rapidly decomposes it, setting the hydrogen free, but the gas does not inflame unless the water be hot or the globule of metal enclosed in a piece of paper to confine the heat; the gas then takes fire, and the soda formed gives it an intensely luminous monochromatic yellow flame. The metal burns in oxygen, and is rapidly oxidized in the air. It forms an amalgam with mercury, which is employed in extracting gold from quartz, and in the laboratory as a powerful reducing agent. With potassium it forms an alloy, which is fluid at ordinary temperatures. Sodium absorbs 237 times its volume of hydrogen, and forms sodium hydride (Na_2H_2), a white metallic alloy, having a specific gravity of 0.959. There are two oxides of sodium, the protoxide or soda (Na_2O), and the dioxide or peroxide (Na_2O_2); the latter is the pro-

duct of ignition of sodium in oxygen. It is a deliquescent white powder, which readily parts with one of its atoms of oxygen, and by exposing it to a high temperature it is reduced to the protoxide or soda. This very important alkali in this anhydrous state is a gray powder, melting at a red heat. In contact with water, which occasions great development of heat, it forms sodium hydrate or caustic soda (NaHO). This substance is an important article of commerce, and is produced on a very extensive scale from ordinary black-ash liquors, as obtained in making the carbonate; these are causticized by milk of lime, and evaporated in large cast-iron pots, very thick, and weighing 10 to 12 tons. The sulphides present are removed by addition of sodium nitrate, any salts separating as impurities being fished out; the pure caustic liquor is still further heated, and passes through several shades of colour, first dark red, then ultramarine blue, and finally becomes at a red heat so clear and colourless that the bottom of the pot can be seen through the dense liquid, weighing usually 12 tons in each pot; it is then allowed to cool down and ladled off into iron drums. It is used in making soap, in the manufacture of paper, and in calico printing and dyeing. The caustic soda thus prepared presents a beautiful white crystalline fracture, and has a specific gravity of 2.00. Another crystalline hydrate is known, having the formula $2\text{NaOH}\cdot\text{H}_2\text{O}$. Caustic soda is a very powerful alkali and a strong caustic, dissolving all animal matter, and reducing vegetable matters to pure cellulose or fibre; hence its use in the manufacture of paper.

Sodium chloride or common salt (NaCl) is abundant in nature, and forms the source from which the principal salts of soda are manufactured. As rock salt it is extensively quarried in Cheshire, and it is still more extensively made from the brine springs of that county, which supply the world with table-salt. Salt lakes are common in desert places in different parts of the world. There are salt mines also in Germany, Poland, Bavaria, Austria and Hungary, India, China, Russia, North and South America. Rock salt is pretty pure, and usually contains 98 to 99 per cent. of sodium chloride, and occurs in large crystals. Table-salt is obtained from the brine pumped up from the springs; the water usually contains about 25 per cent. of salt. It is evaporated in large shallow wrought-iron pans. The salt is deposited and raked out in a variety of different forms or grain to suit different markets. An inferior salt is obtained by the evaporation of sea-water, especially on the shores of the Mediterranean. It usually crystallizes in anhydrous cubes, soluble in three-parts of cold water, and it is little more soluble in hot water. A saturated solution contains 26 per cent. It is insoluble in alcohol. Salt is much used for salting meat and for the manufacture of sodium carbonate. It forms an important part of the mineral wealth of Great Britain, and was at one time heavily taxed, the duty in 1794 having amounted to £30 a ton, and although repealed in this country since 1823, a similar tax forms no inconsiderable part of the revenue of certain nations. The total produce of salt in Great Britain amounts to 2,700,000 tons annually, of which about half is exported.

Sodium chlorate (NaClO_3), a salt crystallizing in tetrahedrons, is manufactured on the large scale to replace the corresponding potash salt in many of its applications; it has the advantage of being very much more soluble in water.

Sodium bromide (NaBr) crystallizes in anhydrous cubes resembling the chloride. It is very soluble in water and alcohol. It is present in sea-water and some saline springs.

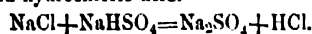
Sodium iodide (NaI) is also a constituent of sea-water, and is found in greater quantity in sea-weed. It crystallizes in cubes, which are deliquescent, and very soluble in water and alcohol. It is employed in the precipitation of gold and silver from iron and copper pyrites.

Sodium fluoride (NaF) crystallizes in cubes, soluble in water, but insoluble in alcohol. The solution etches glass.

Sodium Sulphates.—There are two sulphates of soda—the acid sulphate or bisulphate (NaHSO_4), and the neutral sulphate (Na_2SO_4). The bisulphate crystallizes in large prisms, containing two atoms of water. The neutral sulphate, known in the crude commercial form as salt-cake, is found native as Thenardite, and occurs in many mineral waters. It crystallizes in large prisms with ten atoms of water, and is known in this form as Glauber's salts. It is made on a most extensive scale in the alkali works by decomposing salt with sulphuric acid in a large cast-iron pot set in a decomposing furnace; the reaction is commenced in the pot and finished on the bed of the furnace at a red heat. The bisulphate is first formed in the pot by the following reaction:—



In the furnace the bisulphate is further decomposed into salt-cake and hydrochloric acid.

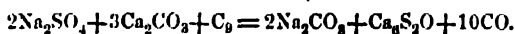


The hydrochloric acid, which is driven off in the gaseous form, is passed up a stone tower packed with coke, on which a current of water descends and absorbs the gas, forming the so-called marine acid. Sodium sulphate is a by-product in many other chemical processes. The crystals of Glauber's salts ($\text{Na}_2\text{SO}_4\cdot 10\text{H}_2\text{O}$) effloresce in the air and lose the water of crystallization, leaving the anhydrous sulphate. The solution of this salt is remarkable for showing the phenomena of supersaturation. A saturated solution allowed to cool in a closed flask remains liquid, but directly the cork is removed and the air admitted it crystallizes immediately.

Sodium sulphite (Na_2SO_3) crystallizes with seven atoms of water. It is sometimes employed in bleaching as an antichlor. It is made by saturating sulphurous acid with sodium carbonate.

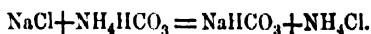
Sodium hyposulphite ($\text{Na}_2\text{S}_2\text{O}_3\cdot 5\text{H}_2\text{O}$) crystallizes in large monoclinic crystals, very soluble in water. It is much used as an antichlor in bleaching and in the fixing of photographic pictures. It may be made from the calcium hyposulphite of alkali waste by precipitating it with sodium carbonate and evaporating the solution after separating the calcium carbonate by filtration. Sodium forms a number of sulphides similar to those of potassium.

Sodium Carbonate.—There are two carbonates of soda, the carbonate or neutral carbonate (Na_2CO_3), and the bicarbonate or acid carbonate (NaHCO_3). The carbonate, which is generally known to commerce as soda, is found native as natron in some lakes, especially in Egypt; it is often seen with sodium sulphate as an efflorescence on mortar, particularly where sea sand has been used. It was formerly obtained from kelp and from barilla, but is now entirely made from the decomposition of salt-cake by Le Blanc's process, and from salt by the soda-ammonia process. The salt-cake is roasted in a reverberatory furnace with limestone and coal. The actual reactions which take place are complicated, but generally the main decomposition is as follows:—The sodium sulphate is reduced to sulphide, which reacts on the calcium carbonate, forming calcium sulphide and sodium carbonate; carbonic oxide is driven off, and a portion of the lime combines with the calcium sulphide, forming calcium oxysulphide.



The mass, as drawn from the furnace at a red heat, is a dark vitreous compound, called ball soda. This is lixiviated in iron tanks with warm water, which dissolves out the sodium carbonate, leaving the calcium oxysulphide with other insoluble impurities, which form the tank waste or alkali waste, a waste product exceedingly difficult to deal with or to dispose of. Moreover, it carries off the whole of the sulphur of the salt-cake. Many attempts have been made to utilize this large by-product, but these have hitherto

been only partially successful, and it still continues the *bête noire* of the Le Blanc process. The solution of soda is evaporated down and crystallized. It crystallizes in large beautiful crystals, containing 10 atoms of water; these effloresce in dry air, leaving the anhydrous carbonate. The salt fuses at a red heat, and is employed as a flux; it is an important article of commerce, and much used in washing and bleaching, and in the manufacture of soap, paper, and glass. It is obtained pure by calcining the bicarbonate or bitartrate. The bicarbonate is obtained by exposing the dry carbonate to the action of carbonic acid, and also by adding a solution of ammonium bicarbonate to a solution of common salt. The sodium bicarbonate crystallizes out on standing, and ammonium chloride remains in solution according to the following reaction:



This process has been known for many years, and was first invented and worked for the manufacture of bicarbonate; although this salt then brought a high price, the process was unsuccessful on account of the serious loss of ammonia, which was then also an expensive article. Within the last few years, however, this process has been so improved, that under the name of the soda-ammonia process it has produced ordinary soda of such purity and at such a low price that the ordinary Le Blanc process is unable to compete with it, and a large portion of the soda of commerce is now made by this method. The ammonia is all recovered from the chloride, and recarbonated and used over and over again without material loss. Sodium bicarbonate is found in many mineral waters; it is usually met with in commerce as a fine crystalline powder; it is slightly alkaline and soluble in cold water; the solution, when boiled, gives off carbonic acid. It is distinguished from the carbonate by not precipitating solutions of salts of magnesia.

Sodium nitrate (NaNO_3) is known as Chili saltpetre or soda nitre. It is found in large beds in Chili and Peru, about 3000 feet above the sea, and is called *salitre*. The crude salt is simply dissolved in water and recrystallized. It crystallizes in rhombohedrons, and is very soluble in water. It melts and is decomposed at a red heat, and forms an explosive compound with charcoal and sulphur, but it is unsuitable for gunpowder. It is largely imported into this country, and extensively used in the manufacture of nitric acid and oil of vitriol, in making saltpetre from potassium chloride, and in agriculture as a forcing manure for top dressing and for mixing with other manures.

Sodium borate or *borax* ($\text{Na}_2\text{B}_4\text{O}_7 + 10\text{H}_2\text{O}$) is an important commercial salt of soda. California alone exports 8,000,000 lbs. per annum. See BORIC ACID.

Sodium Phosphate.—There are a number of phosphates of soda; the only one of commercial importance is the disodic orthophosphate, or neutral phosphate of soda (Na_2HPO_4). This salt is found in the blood and urine; it crystallizes in prisms with twelve atoms of water, and is very soluble in water. It is used in medicine and in calico printing.

Sodium acetate ($\text{NaC}_2\text{H}_3\text{O}_2$) is a very soluble crystalline salt used in making acetic acid and in dyeing. The saturated solution has been recently employed instead of water for filling the foot-warmers of railway carriages, as it retains the heat much longer than water.

Sodium oxalate ($\text{C}_2\text{Na}_2\text{O}_4$) is an anhydrous crystalline salt found in many plants and in seaweed.

Sodium tungstate (Na_2WO_4) crystallizes in shining scales; it is very soluble in water, and is employed as a mordant in dyeing, and also as the best salt for rendering cottons, muslins, and other dress materials unflammable.

Sodium arseniate ($\text{Na}_3\text{AsO}_4 + 12\text{H}_2\text{O}$) crystallizes in rhombic prisms. It is employed as a mordant in turkey-red dyeing.

Sodium antimoniate or *acid metantimoniate* ($\text{Na}_2\text{OSb}_2\text{O}_5 + 7\text{H}_2\text{O}$) is the only salt of soda which is at all insoluble. It deposits in small crystals, and the reaction is sufficiently delicate to indicate the one-thousandth part of a soda salt in solution.

Sodium bichromate or *acid chromate* ($2\text{NaCr}_2\text{O}_7 \cdot \text{Cr}_2\text{O}_3$) is a yellow soluble salt, now much employed in dyeing instead of the potash salt.

Soda alum, $\text{NaAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$, is a double sulphate of sodium and aluminium, which is found native.

Sodium compounds are easily recognized by the intense yellow colour imparted to the outer blowpipe flame and to burning alcohol; in spectrum analysis the sodium gives a single bright yellow line, coincident with the solar line D; the test is so sensitive that it is difficult to meet with any substance which does not give this indication of the almost universal presence of soda, and from the dust of the atmosphere. The only precipitant for sodium salts is the metantimoniate of potassium, which gives a white crystalline precipitate; but it is seldom employed, the soda in quantitative analysis being generally estimated by difference.

Medicinal Properties of Sodium Salts.—Experiments have shown that while potassium salts may, in some cases, be poisonous, sodium salts, as far as the base is concerned, are inert; this fact, coupled with their greater solubility in water, has recently led to the use of a large number of these salts in medicine. Some have been long employed medicinally, as the carbonates and bicarbonate, as antacids; the sulphate (Glauber's salts), soda-potassa tartrate (Rochelle salts), as in scidilitz powders, and the phosphate (tasteless purging salt) as aperient. Glauber's salts act more on the liver, and are more agreeable to take than Epsom salts; these two salts form the basis of Hunyadi Janos, Friedrichshall, and other aperient natural mineral waters, and in these agreeable combinations minute doses of the salts are rapid purgatives. The borate (borax) and acetate are used as diuretics; the benzoate and hypophosphate in phthisis; the bromide in epilepsy; the chlorate in stomatitis; the nitrite in angina pectoris; the iodide as an alterative; the arseniate in skin diseases; the hypophosphate in diphtheria. The salicylate is used as an antiseptic, and the permanganate forms an efficient disinfectant for the sick room. Sodium silicate, or soluble glass, is employed in surgery for soaking bandages applied to fractures; it arrests putrefaction and dries to a rigid form insoluble in water.

SODOM, APPLE OF. See SOLANUM.

SODOMA, IL, and **RAZZI**, the names by which Giannantonio Bazzi is commonly called, are corruptions; the first arose from the conversion of his name of Sodona, inscribed on a picture in the town-hall of Siena, into Sodoma, and the second from an early misprint. He was born at Vecelli in Piedmont about 1477, and acquired the first principles of his art from Martino Spanzotti of Casale. He eventually settled in Siena, there acquired the freedom of the city, and became the most distinguished of its painters. He acquired great distinction for some frescoes in the monastery of Monte Oliveto, between Siena and Rome, which he completed in 1502. These spread his reputation to Rome, whether he was invited by Agostino Chigi. He was employed also by Pope Julius II in the Vatican Stanze, but the pictures he painted there were destroyed shortly afterwards to make way for the works of Raffaele. He returned to Siena, where he married in 1510. His greatest works are the frescoes of the chapel of St. Catharine of Siena in the Church of San Domenico, painted in 1526, still in a good state of preservation, and universally admired by artists, and the splendid classical frescoes of the Villa Farnesina at Rome, on subjects in the life of Alexander the Great. He executed several other important works at Siena as late as 1538; he was then employed at Volterra, Pisa, and Lucca; but he eventually died poor in the great hospital of Siena on 14th February,

1549, leaving an only daughter, married to his pupil Bartolomeo Neroni. Neither his great reputation nor his honours saved him from poverty. His works were chiefly fresco, and he was latterly careless. Had he been more employed in painting easel pictures in oil his fortunes might have been better; works of this kind by Sodoma are very scarce. His "San Sebastian," painted in 1515, and now one of the glories of the Uffizi Gallery, Florence, is probably the finest of all the many Sebastians that exist; the touching beauty and intense mental agony of the young martyr cannot be surpassed. Leo X. created him a cavaliere of the order of Cristo, and the Emperor, Charles V., gave him the title of a count palatine of the empire.

SÆUR, HUBERT LE, an excellent sculptor, was the pupil of the celebrated John of Bologna. He came to England about the year 1630, when he must have been about fifty years of age. In 1633 he was employed by the family of Howard-Arundel to cast the well-known equestrian statue of Charles I. placed in its present position, at Charing Cross, at the expense of the crown, about 1678. The pedestal was executed by Grinling Gibbons. Le Sæur executed many other bronze or brass works in England, but they are now all lost or destroyed.

SOFA LA, anciently written *Cyphla*, is a country on the east coast of Africa, extending from Cape Corrientes, 25° S. lat., to the vicinity of the river Luabo, the most southern arm of the Zambesi, 19° S. lat. It comprises the Portuguese possessions of Senna, Tété, Sofala, and Inhambane—which form part of the captivity-general of Mozambique—besides the regions near Delagoa Bay, nominally under their control, but their authority extends only a few miles from the coast. The country was formerly known by the name of Monomotapa, and was noted for the quantity of gold which was supposed to exist in it. In fact, some of the old geographers considered it to have been the Golden Ophir to which Solomon sent a fleet of ships every three years. At present the name of Monomotapa is antiquated, and the few gold mines which exist are included in the province of Senna.

The coast is low and indented by a deep bay of the same name, within which is an estuary named the Sofala River. The town of Sofala, with about 2000 inhabitants, lies at the mouth of this estuary, and has a fine natural harbour. Adjacent are several islands, as the Bazaruto Islands and Chuluwan, which is 16 miles long, and nearly divided into two parts by a salt creek opening into the small channel that separates it from the mainland.

The interior of Sofala is full of swamps, densely wooded, and generally unfavourable to European life. It abounds with elephants, rhinoceroses, lions, boars, and antelopes.

Tory, hog-swine, hides, rhinoceros' horns, amber, and gum dust constitute the principal articles of export; they are sent to Mozambique.

SOFT-GRASS (*Holcus*) is a genus of Grasses characterized by a flat leaf with numerous crowded two-flowered spikelets, the lower flower of which is perfect and fertile, while the upper is male, with a shortly awned perianth. Two species are natives of Britain, the Meadow Soft-grass (*Holcus lanatus*) and the Creeping Soft-grass (*Holcus mollis*). Both are perennial grasses, and derive their common name from their soft waxy herbage. The meadow soft-grass grows in meadows and pastures to a height of 1 or 2 feet, and has fibrous roots. The creeping soft-grass is found on a drier, lighter soil; it is less hairy, and has creeping roots. The roots contain nutritious matter, and are given to cattle and pigs, but the herbage is of little value.

SOIL is a superficial mixture of decomposed animal and vegetable matter, with a greater or less proportion of sand, clay, and marl, and covering almost all parts of the earth's surface where the rocks exhibit a pulverulent condition, and where chemical states allow of its accumulation. Its nature

depends almost exclusively upon the character of the sub-soil or unaltered rocky particles beneath, for it is mainly formed *in situ*; but in some areas there can be no doubt that the transport of fine dust by the wind is also of no small importance in its production. Earthworms appear to contribute more than any other agency to the increase in thickness of soils, and also to their renewed fertility, by continually bringing the lower layers to the surface in the form of castings, and a study of these interesting phenomena was the subject of the last treatise from the pen of the late Charles Darwin.

SOISSONS, a fortified city of France, in the department of Aisne, on the river Aisne, occupying an important position in regard to the defence of Paris, from which city it is distant 65 miles north-east. It was formerly the chief stronghold of the *Suessones*, whence the name. It is rich in historical associations. The old chateau, on the site of the palace, is flanked by heavy round towers. Other buildings are, the arsenal, the college, Hôtel Dieu, house of correction, museum, and library of 19,000 volumes, two barracks, theatre, &c. A bridge leads over to St. Vaast. There are several fine churches in the town, of which that of St. Gervais is famous for its vast size. There is a brisk trade in corn, flour, vegetables, and wood for the supply of Paris; coarse linen, tapestry, and leather are the chief fabrics. The population in 1881 was 11,112.

SO'JA. See SOY.

SOKE. See SOCAGE.

SOK RATES (*Gr. Sokratis*, Lat. *Socrates*) was born at Athens in B.C. 469. His father, Sôphroniskos, was a sculptor; his mother, Phainaretê, a midwife. He was originally destined for his father's profession, and we are told that he gained much proficiency in his art. Statues by him were shown, down to the time of Pausanias. He did not, however, devote himself to this employment, though he carried it on so far as to earn a decent subsistence from it, but as he inherited some little property on his father's death, he devoted the greater part of his time to philosophy, reading all the works of former and contemporary philosophers. He became a hearer of most of the great philosophers who visited Athens during his time, especially of Anaxagoras and his successor Archelaos, and of the luxurious and accomplished Prodikos. He also served his country faithfully as a soldier, according to the duty of all Athenian citizens. During the Peloponnesian War he made three several campaigns. In the first of these he took a part in the long blockade of Potidaia, during which he saved the life of Alkibiades. The scene of his second campaign was Boeotia, where he fought for his country in the disastrous battle of Delion. Here he saved the life of another of his pupils, Xenophôn, whom he carried from the field on his shoulders. In his third campaign he served at Amphipolis. As a member of the deliberative senate he showed great firmness in voting against the iniquitous sentence by which the victors of Arginœus were condemned to death, B.C. 406, for not endangering the result of the contest by stopping the pursuit to save their sailors who had fallen overboard. He did not leave Athens even when the tyranny of the Thirty had reached its height, but courageously stood forward to withstand their arbitrary violence. That Sokrates was not well disposed to a democratic constitution of his country, on the other hand, is proved, to a certain extent, by the fact that the indictment on which he was condemned and executed was brought forward by Anutos, one of the chief of those citizens who assisted Thrasuboulos in restoring the old state of things. His outspokenness in exposing the ignorance of all men, of the greatest as well as of the humblest, and that for a period of twenty-five or thirty years, by public discussions with whomsoever he met, finally brought about an opinion generally unfavourable to him in Athens, and this opinion was sup-

ported by the comic dramatists, as for instance Aristophanes, who introduced Sokrates into his celebrated comedy, "The Clouds," as a mischievous speculator on matters of religion, and as a corrupter of the youth of Athens. This and other comedies had their share in producing the condemnation of the philosopher, and the two principal charges brought against him on his trial (B.C. 399) constitute the leading features in the satirical censure of Aristophanes. The accusers, Melétos, Anutos, and Lukôn, stated their charges as follows:—"Sokrates is guilty of impiety in not acknowledging the gods acknowledged by the state, but on the contrary, introducing new deities; and he also does wrong in corrupting the youth." Xenophon seeks to justify his master from these charges, on which a small majority of judges pronounced him guilty. That a majority, only some five or six, should be found in a vote of about 557 is a remarkable proof of the fairness of the Athenians towards Sokrates. The wonder is that he was not arraigned long before, and that being arraigned, he was not condemned by a large majority. For there is no doubt but that he professed a new and strange doctrine of personal inspiration, and was technically guilty of death for heresy. Nevertheless he would have been acquitted had not he deliberately reversed the usual methods of defence and assumed the attitude of a teacher of ignorant men, instead of that of one desirous of acquittal. Evidently he was careless of a longer life, and preferred to obey his "dæmon's" advice to "let things go." On being called up to receive his sentence he treated the dikastay, or court of citizen judges which had tried him, with contemptuous disdain, and he was sentenced to death by a much larger number than those who had voted him guilty. The festival of the Theôra gained him a reprieve of thirty days, during which his friend Kritô would have provided for him the means of escape from prison, but he would not avail himself of the opportunity. His sentence was carried into execution by his taking a cup of hemlock at the end of the month Thargelion (B.C. 399). He met his fate with calmness and resolution, in the conviction that there is another life after this.

Sokrates is the chief interlocutor in the wonderful "Dialogues" of Plato, and though he never committed any of his own thoughts to writing he has left indisputable traces of the important innovations in science of which he must be considered as the author. We have three authorities for his doctrines: Xenophon's "Memorabilia;" the Platonic "Dialogues" already mentioned; and the "Sketches" of Aristotle.

Xenophon is the apologist of Sokrates, and, independently of this, he may be considered as having only exhibited the practical part of his teaching, which, however, some people may consider to be the best part.

As to Plato, the Sokrates whom he represents with such dramatic truth appears to have been the philosophical, as he is the formal, basis of all that Plato has done for science. Aristotle tells us that Sokrates philosophized about virtue, and made some real discoveries with regard to the first principles of science; and this is the philosophical basis which we discern in the hero of Plato. We find him always endeavouring to reduce things to their elements, stripping realities of their pompous garb of words, and striving to arrive at truth; and we also find that his philosophy is generally applied to ethics. With him the scientific and the moral blend with one another, for knowledge is the final cause of the will, and good is the final cause of knowledge; hence he who knows what justice is must needs be just, since no one wittingly departs from that which he knows to be good. Sokrates considered it to be his particular vocation to awaken the idea of science in the minds of men. This is clear from the manner in which he is said to have insisted upon the consciousness of ignorance, which consciousness, however, was not the limit of

philosophy, but only the preliminary to the attaining to true knowledge. His antagonistic opposition to the Sophists shows this. They professed to know everything, without having the idea of science, or knowledge of what knowledge is; and as he had that idea without the mass of acquirements on which they prided themselves, he was naturally their opponent. His strife with them is carried on entirely in this way, that he endeavours to nullify the effects of their acquired knowledge by shifting the ground from the objects to the idea of science, whereby he generally succeeds in proving their deficiency in the one thing needful to the philosopher. The irony of Sokrates has been well described as the co-existence of the idea of science in him with the want of clear and complete views on any objects of science—in a word, as the knowledge of his ignorance. With this is intimately connected the indirect dialectical method which he invariably adopted, and which may be considered as his method of extracting scientific truth from the mass of semblances and contradictions by which it was surrounded. His *dæmonion*, or secret monitor, a name given afterwards, but never used by Sokrates himself, seems to have been little more than a name which he gave to those convictions on practical subjects which sprang up spontaneously in his mind, and for which he could not find any satisfactory means of accounting, though he felt himself constrained to follow in the course which they prescribed. The advice of this divine voice was always negative. He never felt impelled towards action by it, but was often restrained from action by it, and habitually obeyed its warning. He undoubtedly regarded himself as having a religious mission, and from middle life gave up his whole life to public disputation, never taking any fee from those who sought his instruction, nor recognizing any set relations of master and pupil between them. He talked indiscriminately with all men; and the accosting of some pompous rhetorician or statesman by Sokrates was the signal for a crowd to gather, sure of intense amusement at the expense of the victim, and a fine intellectual treat at the way in which Sokrates would be certain to turn his opinions inside out. We know that he was famous for doing whatever he liked with his opponents in discourse. It is quite certain that his friend Chairophon really consulted the oracle at Delphi, as the tradition says he did, to know if any one was wiser than Sokrates, and that the priestess replied, "No one was wiser than Sokrates." Upon hearing this oracle Sokrates left all things else to discover in what lay this wisdom of which he himself was so unconscious, and after years upon years of questioning all kinds of presumably learned men and finding them actually ignorant, Sokrates decided that his own wisdom lay in the fact that he was more truly conscious of knowing nothing really well than were most men.

In person Sokrates was no less singular than he was in manner and dress. He had large projecting eyes, a sunken nose turned up at the end, with wide dilated nostrils, and a great unwieldy stomach. Plato and Xenophon extol his invariable good temper, but Aristoxenos describes him as naturally irascible, however great his acquired command over himself. Sokrates was married to a shrewish wife, Xantippê, whose name has in consequence become proverbial. He had three children. He lived in complete poverty, and thought a stout cloak sufficient clothing. In the severest weather he went barefoot. Yet he was quite ready to join in a pleasant banquet when invited, for he was no ascetic; and besides, on such occasions there was sure to be ample field for his favourite pursuit of examining the opinions of all men.

The best exposition of the character and doctrines of Sokrates with which we are acquainted occurs in the sixteenth chapter of Mr. Grote's invaluable "History of Greece." "There can be no doubt," as Grote says, "that his individual influence permanently enlarged the horizon, improved the

method, and multiplied the ascendant minds of the Grecian speculative world in a manner never since paralleled."

SOL, the monetary unit of Peru. As settled by the law of 1864 the gold sol, worth nominally 5 francs French money, weighs 1·613 grammes, ·900 fine, and is therefore worth 3s. 11½d. sterling. The silver sol weighs 25 grammes, ·900 fine, and is intended to be of the same value. Gold pieces of 20, 10, 5, and 2 sols, as well as single gold sols, are struck, and the silver pieces are a sol, a half sol, and a fifth sol.

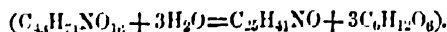
SOL'AN GOOSE. See GANNET.

SOLANA'CEÆ is an order of plants belonging to the group COROLLIFLORE. The species are numerous, chiefly natives of the tropics, though a few are found in temperate countries. They are herbs, sometimes shrubs, very rarely trees, with alternate leaves, often in pairs, and regular or slightly irregular flowers, terminal or axillary, often extra-axillary, on bractless stalks. The calyx is generally five-parted and persistent; the corolla is hypogynous, and wheel, bell, funnel, or salver shaped, with a limb having five, rarely four or six, segments; the stamens are inserted on the tube of the corolla, equal in number to its segments and alternate with them; the anthers are two-celled, dehiscing longitudinally, or by terminal pores; the ovary is usually two-celled, with axil placentas, and surmounted by a simple style with a simple or lobed stigma. The fruit is a capsule or a berry, with numerous albuminous seeds.

Solanaceæ is an important order of plants, from the useful properties of many of its species. Many possess strong narcotic properties, and are used in medicine. Belladonna, a remedy for neuralgia and rheumatism, is obtained from the roots and leaves of *Atropa belladonna* (deadly nightshade), which contain an alkaloid principle, *atropine*. [See *ATROPA*.] Belladonna has also a specific action on muscular fibre, and is used to relax the iris, and thus dilate the pupil in diseases of the eyes, and to aid the breathing in asthma and whooping-cough. The HENBANT (Hyoscyamus) is another poisonous narcotic, less powerful than belladonna. *Datura stramonium* (thorn apple) is highly narcotic, and is a remedy in asthma; other species of *Datura* possess the same properties. Mandiagora (MANDRAKE) is another powerful narcotic. The foliage of some species of SOLANUM, including the Potato (*Solanum tuberosum*), have similar, but less powerful properties. The *Physalis* (TOMATOE) is used as TOBACCO, the active principle of which is a very poisonous narcotic alkaloid, *nicotine*.

Some of the species of this order are, however, among the most useful vegetable products. Foremost comes the POTATO (*Solanum tuberosum*), cultivated all over the world for the sake of its edible tubers. The TOMATO (*Lycopersicon esculentum*) is also extensively cultivated for the sake of its bright red pulpy fruit, which is used as a vegetable. The species of CAPSICUM are remarkable for the pungency of their fruits, the Chili being the berry of *Capsicum annuum* and Cayenne pepper consisting of the powdered seeds of other species. The fruits of several species of Solanum are eaten.

SOLANINE, an organic base found in the woody nightshade (*Solanum dulcamara*, natural order Solanaceæ), also in the potato (*Solanum tuberosum*), and in *Solanum nigrum*. It crystallizes in silky needles, soluble in alcohol, but insoluble in water and in ether. The formula is $C_{41}H_{71}NO_{16}$. It is bitter and very poisonous, and forms a number of soluble crystalline salts with acids. The formula of the hydrochlorate is $C_{41}H_{71}NO_{16}HCl$. It forms a yellow chloroplatinate ($2C_{41}H_{71}NO_{16}2HCl PtCl_4$). Solanine is a glucoside, and when treated with dilute sulphuric acid splits up into solandine ($C_{22}H_{41}NO$) and glucose



Solandine is insoluble in water, but soluble in alcohol

and ether. It crystallizes in silky needles, which melt at 200° C. (392° Fahr.), and sublimes unchanged. It is a strongly alkaline base, and forms crystalline bitter salts with acids. The formula of the hydrochlorate is $C_{22}H_{41}NOHCl$.

SOLA'NUM is the typical species of the order of plants SOLANACEÆ. The species are very numerous and widely distributed, but especially abundant in South America. They are herbs or shrubs, very rarely small trees. The calyx and corolla are five-parted, the latter being wheel or bell shaped, with a short tube; the stamens are five, with short filaments and anthers opening by two pores at the top; the fruit is a many-seeded berry. The genus includes some of the most poisonous and some of the most useful of plants. The properties of these plants, however, do not differ in kind, but in degree, and the berries and leaves, and even the tubers, when uncooked, of the potato, possess in a mild degree the narcotic properties of the poisonous nightshades. Many of them have also very handsome flowers.

The most important species is *Solanum tuberosum*, the POTATO, a native of South America. *Solanum nigrum* (garden nightshade) is common in gardens, fields, and waste places in Great Britain. It has white flowers, producing small black, yellow, or red berries. *Solanum dulcamara* (woody nightshade or BITTER-SWIFT) is common in hedges and copses in Great Britain. It has purple flowers and crimson berries, which latter may be mistaken by children for red currants, a mistake that has sometimes been attended with fatal consequences. Both these species have been used medicinally as narcotics and sedatives. Among other medicinal species, the *Solanum pseudoquina* may be mentioned, which is used in Brazil as a substitute for cinchona. *Solanum toxicarium* is used as a poison by the natives of Cayenne. The Apple of Sodom (*Solanum sodomæum*) is supposed to have been the plant flourishing on the shores of the Dead Sea, with which so many legends are connected. It has a large white fruit, very subject to the attacks of insects, which deposit their eggs therein; and the growing larvæ convert the interior into a powdery dust, very bitter to the taste. Many of the species are used for food. The Egg-plant (*Solanum esculentum*), from tropical Asia, has purple berries about the size and form of a goose's egg, which are imported to Europe. The Kangaroo apple of Tasmania is the fruit of *Solanum laciniatum*. The fruits of several other species are eaten in the different parts of the world in which they occur, and of some species, as *Solanum oleraceum* in the West Indies, the leaves are eaten. Other species yield dyes, as *Solanum indigoferum* from Brazil.

SOLAR SYSTEM. Our sun is the presiding ruler of a vast host of smaller bodies which circulate around him or in other ways acknowledge his omnipotent sway. This whole group of smaller bodies, together with the sun himself, constitute what is known as the solar system. But the solar system really embraces only a very minute fraction of the total number of visible objects in the heavens. Of all the hosts of stars which we see every night, not one belongs to the solar system or is in any way related thereto. The stars are all at incredible distances. [See *STAR*.] They are so far off that our sun, if viewed from one of them, would have shrank to the insignificance of a star himself. They are, indeed, so remote as to be practically beyond the sway of the sun. The bodies which constitute the solar system are an isolated group in the realms of space; they are really nestled up quite close to the sun, and would be wholly invisible from any of the stars. The stars may in like manner have systems circulating around them; but even if stars were attended by far more splendid systems than ours these systems would yet remain invisible from the earth. The objects which belong to the solar system are the sun himself, the planets and

their satellites, comets, shooting stars, and the material, whatever it is, which forms the zodiacal light. A general view of the chief part of the solar system is shown in the Plate prefixed to this volume. The central point denotes the place of the sun; around him are a number of nearly circular orbits, which represent the paths of the planets. The orbit nearest the sun is claimed for a planet whose existence is still problematical. Vulcan is the name of this planet of romance. He is believed to have been seen once, if not oftener; but he has not yet emerged from obscurity into that satisfactory condition which would qualify him for the pages of the *Nautical Almanac*. Some planet nearer to the sun than Mercury was probably seen by the late Professor Watson during the total eclipse of the sun in 1878. It has possibly been seen on other occasions, but as its path is not yet known we cannot be sure how far the supposed observations could apply to the same object. It is possible also that Vulcan may not be the only planet thus circumstanced; there is, at all events, ground for a conjecture that there may be at least one other. Discarding these planets of more or less uncertainty, we first come, in passing outwards from the sun, to the planet Mercury, then to Venus, to the Earth and Mars, then to a vast host of minor planets, while outside the minor planets are the giants of the system, Jupiter, Saturn, Uranus, and Neptune. We refer to the articles under the names of the different planets for more detailed information.

Our Plate also exhibits the relative sizes of the different planets. Towering above all the others we have the majestic globe of Jupiter, which is 1500 times as large as the earth. Saturn is somewhat less than Jupiter. Uranus and Neptune are a great deal less than Saturn, but even with respect to Uranus and Neptune the earth is but a very considerable object.

The Plate exhibits the orbits of the planets as far outwards as Uranus, but the planet Neptune, exterior to Uranus, is too remote to be included. The exterior planets are also attended by remarkable systems of moons. Jupiter has four moons, Saturn has no less than eight, while Uranus has four, and Neptune one. Mars is attended by two satellites, and the earth by one, but no satellites have as yet been satisfactorily credited to Venus, and none have ever been suggested for Mercury. Saturn is unquestionably the most remarkable planet in our system, perhaps the most wondrous object the telescope has ever disclosed. He is surrounded by the marvellous rings which are without a parallel in any other part of the solar system, or, so far as we can tell, in the universe itself. The Plate also shows the orbit of a comet, or rather that part of its orbit in which a comet moves during the brief period of its sojourn in the neighbourhood of the sun. To render the map complete the orbits of the comets would have to be shown in hundreds. We also see on the map a series of circles indicating the apparent size of the sun as it would be beheld from the different planets. Mercury is at one end of the list and Neptune at the other, while the earth is in its intermediate position between Venus and Mars. At first it might seem as if the apparent size of the sun was related to the climates enjoyed by the different planets. Mercury, with a sun five or six times the size of ours, would seem to be vastly hotter than the earth, while the same sun only shows a minute disc to Neptune. It must, however, be remembered that the climate is not solely dependent on the distance of the sun. Were this so the climate all over the earth should be exactly the same, seeing that all regions on the earth are, practically speaking, at the same distance from the sun. Indeed it so happens that we in the northern hemisphere are actually nearer the sun in the winter than we are in summer. The climate is affected by the elevation of the sun above the horizon, by the atmosphere, and more especially by the watery vapour which the atmosphere contains. It would be quite possible,

with the same sun at the same distance, to produce very different climatic conditions by merely changing the atmosphere and the vapour it contains. At present we know little—we scarcely know anything as to the atmospheric and meteorological conditions of the planets. It follows that although we may in a general way conclude that the planets near the sun enjoy warmer climates than those far off, yet we cannot attempt to say that the actual nature of the climate is to be expressed by any law which depends solely on the distance of the sun.

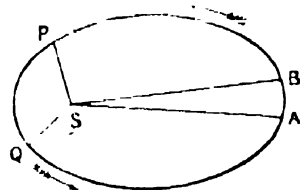
Although the Plate represents the orbits of the various planets as lying in the same plane, yet this is not strictly true. The planets move in planes which are slightly inclined to the plane of the ecliptic. The actual shapes of the paths of the planets are also nearly circles, but when carefully measured the orbits are seen to be really ellipses [see ELLIPSE], and the nature of the movements of the different planets is embodied in the three famous laws of Kepler—

1. Each planet revolves in a plane ellipse, having the sun situated in one of the foci.

2. Each planet moves with a variable velocity determined by the condition that the line drawn from the sun to the planet sweeps over equal areas in equal times.

3. Comparing the motions of two planets together, we find that the squares of the periodic times are proportional to the cubes of the mean distances.

In the adjoining figure $A B P Q$ denotes an ellipse, of which S is one of the foci. The sun is presumed to be situated at S , and the planet describes the circumference of the ellipse according to the first law. While the planet moves from A to B ,



the line from the sun to the planet sweeps over the area $A S B$, and in moving from P to Q the radius sweeps over the area $P S Q$. Kepler's second law asserts that if the

area $A S B$ be equal to the area $P S Q$, then the time taken by the planet in moving from A to B is equal to the time taken by the planet in moving from P to Q . This will explain the variations in the velocity of the planet: as the distance $P Q$ is much longer than $A B$, it follows that the velocity of the planet must be greater when moving through $P Q$ than when moving through $A B$. It hence follows that when the planet is near the sun it must be moving more rapidly than when it is at a distance from the sun.

To illustrate the third law of Kepler we may take the cases of the Earth and of Venus. The periodic times of these two planets are respectively 365.3 days and 224.7 days, while the mean distances are in the ratio of 1.0000 to 0.7233. Now we have by an easy calculation

$$\left(\frac{365.3}{224.7}\right)^2 = 2.643, \text{ and } \left(\frac{100.0}{723.3}\right)^3 = 2.643,$$

which verifies the law. The three laws are found to be borne out completely, even to their minutest details, when proper allowance has been made for every disturbing element.

We require to have the means of specifying with precision the actual circumstances of each planetary orbit. For this purpose it will be necessary to define the simplest manner in which an orbit can be specified, or in other words to define what are known as the *elements* of a planetary orbit. There are six quantities required for this purpose.

1. The *mean distance*, $A C$, or half the longer axis, $A B$, of the ellipse. See figure following.

2. The *eccentricity*, which is the ratio of the distance $C S$ between the centre of the ellipse and the focus of the mean

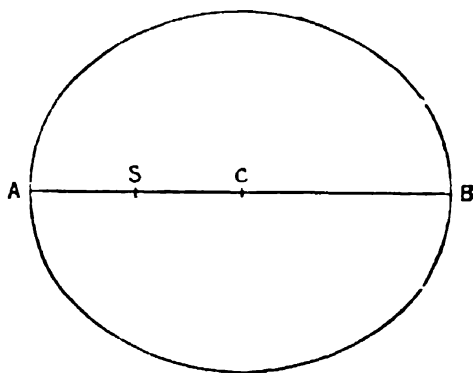
distance $c A$. These two elements determine the size and the shape of the orbit.

3. The longitude of the ascending node. This gives the position of the line in which the actual plane of the orbit cuts the plane of the ecliptic.

4. The inclination of the plane of the orbit to that of the ecliptic. These elements determine the position of the plane in which the orbit lies.

5. The longitude of the perihelion, for which is taken the longitude of the node, added to the angular distance between the node and the perihelion, as seen from the sun. This gives the place of the ellipse in its plane.

6. The time at which the planet passes the perihelion.



The preceding elements having completely defined the shape and position of the orbit, the last is given to enable the planet to be located in its orbit at any given time.

We may add to the preceding the actual time of revolution of the planet around the sun, although, owing to Kepler's third law, this is not an independent quantity, and can be always computed when the mean distance is known.

A curious empirical law has been found connecting the distances of the various planets from the sun. Attention was drawn to this law in 1778 by the astronomer Bode, whose name it generally bears, though really due to Titius. Take the series of numbers 0, 3, 6, 12, 21, 48, each one after the second being formed by doubling the one which precedes it. Add 4 to each of these numbers, and we shall have a series very nearly the relative distances of the planets from the sun. The following table shows the comparison between the distances according to this theory and the actual distances, that of the earth being 10.

Planet.	Numbers of Titius.	Actual Distance.	Error.
Mercury, . . .	$0+4=4$	3.9	0.1
Venus, . . .	$3+4=7$	7.2	0.2
Earth, . . .	$6+4=10$	10.0	0.0
Mars, . . .	$12+4=16$	15.2	0.8
Minor Planets, . . .	$21+4=25$	20 to 35	—
Jupiter, . . .	$48+4=52$	52.0	0.0
Saturn, . . .	$96+4=100$	95.4	4.6
Uranus, . . .	$192+4=196$	191.9	4.1
Neptune, . . .	$384+4=388$	300.6	87.4

The discovery of Neptune has shown that this law is not correct for the whole system, though approximately true for the inner planets.

We append here tables of the elements of the principal planets and of their most important features. These tables have been adopted from those given in Newcomb's "Astronomy." The only changes made have been those necessary in a few instances to bring the tables up to the level of our present knowledge.

ELEMENTS OF THE PRINCIPAL PLANETS.
TABLE I.

Name.	Mean Motion in 365 Days.	Mean Distance from the Sun.		Longitude of Perihelion.	Inclination to Ecliptic.	Longitude of Node.	Mean Longitude of Planet.	Authority.
		Astronomical Units.	Millions of Miles.					
Mercury, . . .	5381016.2925"	0.3870988	35.7	75° 7' 13.8"	7° 0' 7.71"	46° 33' 8.6"	323° 11' 23.53"	Leverrier.
Venus, . . .	2106841.3980	0.7233322	66.4	129 27 14.4	3 23 31.83	75 19 52.2	243 57 41.31	Leverrier.
Earth, . . .	2106841.3040	0.723	66.4	129 27 42.9	3 23 35.01	75 19 53.1	243 57 43.82	G. W. Hill.
Mars, . . .	1295977.4260	1.0	92.3	100 21 21.4			99 48 18.66	Leverrier.
Jupiter, . . .	1295977.4212	1.0	92.3	100 21 41.0			99 48 17.71	Hansen.
Saturn, . . .	689050.8013	1.5236911	141	333 17 53.5	1 51 2.28	48 23 53.0	83 9 16.92	Leverrier.
Uranus, . . .	109256.6197	5.202800	480	11 54 58.2	1 18 41.87	98 56 16.9	159 56 12.94	Leverrier.
Neptune, . . .	43996.0508	9.538852	881	90 3 59.8	2 29 59.80	112 20 52.9	14 50 28.49	Leverrier.
	43996.209	9.5388		90 3 59.8	2 29 39.20	112 20 0.0	14 49 43.50	G. W. Hill.
	15424.797	19.18338	1771	170 38 48.7	0 46 20.92	73 14 37.6	29 12 43.73	Newcomb.
	7365.862	30.05437	2775	46 9 13.1	1 46 58.75	130 7 18.3	334 30 5.75	Newcomb.

ELEMENTS OF THE PRINCIPAL PLANETS.
TABLE II.

Name.	Masses.	Mean angular semidiameters.		Angular diameters at distance unity.		Mean diameter in miles.	Density.		Axial rotation.		Gravity at surface compared with earth.	Periodic time.	Orbital velocity in miles per second.
		at Dist.	at 100	Polar.	Equatorial.		Water=1	Earth=1	Days.	hrs. min. sec.			
Sun.	Unity.	960-0"	1-00	32'	0-00"	32'	0-00"	0-00"	25	to 26	27-71
Mercury.	$\frac{1}{30000000}$ (?)	3-34	...	0	6-68	2932	6-85	1-21	24	5	0-46	87-97	29-55
Venus.	$\frac{1}{130000}$	8-55	...	0	17-10	7660	4-81	0-850	23	21	0-82	224-70	21-61
Earth.	$\frac{1}{597000}$	8-84	...	0	17-64	7918	5-66	1-000	23	56	1-00	365-26	18-38
Mars.	$\frac{1}{3000000}$	4-69	...	0	9-36	4211	4-01	0-708	24	27	0-38	686-98	14-99
Jupiter.	$\frac{1}{1047000}$	18-26	5-20	0	184-2	85000	1-378	0-2433	9	55	2-64	11-86	8-06
Saturn.	$\frac{1}{950000}$	8-10	9-34	0	146-3	70500	0-750	0-1323	10	14	1-18	29-46	5-95
Uranus.	$\frac{1}{44000}$	1-84	14-2	0	70-7	31700	1-28	0-226	Unknown.		0-90	84-02	4-20
Neptune.	$\frac{1}{13300}$	1-28	30-0	0	77-0	34500	1-15	0-204	Unknown.		0-89	104-78	3-36

With reference to these tables it is necessary to remark that the masses of many of the planets are still very uncertain, because exact observations have not yet been made long enough to afford the required information. The mass of Mercury may be estimated as uncertain by one-third of its entire amount, those of Venus, the Earth, Jupiter, and Neptune by $\frac{1}{100}$, while those of Mars, Jupiter, and Saturn are probably correct to $\frac{1}{1000}$. The value of the earth's mass does not include that of the moon. The mass of the latter is estimated at $\frac{1}{81.44}$ that of the Earth. The masses of Mars, Jupiter, Saturn, Uranus, and Neptune are all de-

rived from observations of the satellites of these planets. The diameters are uncertain in many cases, especially in Uranus and Neptune. The densities of these planets must accordingly be regarded as uncertain by half their entire amounts.

SOLDERING is the union of the surfaces of two metals, generally by the intervention of a third. In the ordinary mode of soldering the alloy used as a solder must be more fusible than the metal or metals which are to be united, and must have a strong affinity for them. The solder usually contains a large proportion of the metal to which it is to be applied, in combination with some more easily fusible metals. To insure perfect metallic union between the solder and the surfaces to which it is applied, it is essential that they be made perfectly clean and free from oxide, and that the atmosphere be excluded during the operation, in order to prevent the formation of any oxide while the process is going on. This is effected in various ways, but most commonly by the use of borax, sal ammoniac, or rosin, either mixed with the solder or applied to the surfaces to be joined.

Various kinds of solders or alloys are used, according to the metal which is to be soldered. Platinum is soldered with gold; gold with an alloy of fine gold, silver, and copper. Silver solders usually consist of silver mixed with brass, and sometimes with zinc. Brass, copper, and iron are soldered with an alloy of zinc with copper or brass; articles of wrought iron, and some qualities of steel also, with cast iron—the cast iron being repeatedly heated and quenched in water, by which it becomes sufficiently friable to be beaten to a coarse powder with an iron pestle and mortar. Common *plumber's solder* is made of two parts lead and one part block tin, or of the same metals mixed in nearly equal quantities; bismuth is added when it is desired to make the alloy more fusible. *Soft solder* has two parts tin to one lead; and other alloys of tin, lead, and bismuth are used for uniting various articles of lead, tin, pewter, and other soft compounds. Such highly fusible solders are usually cast in ingots or strips, and melted as they are used by means of an instrument called a soldering iron, which is tipped with copper—that metal being preferred on account of its greater affinity for tin. In soldering tin plates together their edges are made to overlap, but in almost every other case the edges to be joined are made only to meet, the solder being run between their abutting edges.

A kind of soldering, called *burning-to*, has been long practised in some cases with sheet lead, where it has been desirable to make a vessel entirely of that material, the junction being effected by pouring melted lead on to the edges to be united, until they fuse together. Somewhat similar to this is the process introduced under the name of *autogenous soldering*. This process consists in the union of two pieces of metal without the interposition of any solder, by fusing them at the point of junction by jets of flame from a glass blowpipe. The apparatus used for the purpose contains a hydrogen gas generator, bellows for atmospheric air, and valves for regulating the proportion in which the gas and air are to be mixed.

SOLDIER. See ARMY.

SOLDO, a former coin of the Papal States. The term is the Italianized version of the Latin *SOLDUS* (prototype of our shilling). But the Roman soldo sank in value, like its French translation the Sou, till it represented the Roman halfpenny. The old name has therefore been given to the current Italian piece of 5 centesimi, that is, the twentieth part of the Italian *lira* (equal to the French *franc*), although the ancient *soldo* has now disappeared.

There was another soldo, the twentieth part of the Tuscan *lira*, the latter being only worth about $\frac{7}{10}$ d. sterling. This has now entirely disappeared in favour of the coinage of the Italian kingdom.

SOLE (*Solea*) is a genus of fishes belonging to the family Pleuronectidae (FLAT-FISH). The sole has an oblong body, rounded in front, and covered with small scales. The mouth is twisted round to the left side, and has a narrow gape; there are five teeth in bands on the left side only. Both eyes are on the right side. The dorsal fin commences on the snout and extends to the tail, but is distinct from the caudal fin; the anal fin is also long; the pectoral fins are sometimes wanting, and sometimes one only is present. The lateral line is straight. Nearly forty species of soles are known from tropical and temperate seas; some enter or live in fresh water. The Common Sole (*Solea vulgaris*) is abundant on British coasts, especially on the south coast of England, in deeper water than the flounder or plaice, haunting especially sandy or gravelly places. It is also found on the coasts of Europe from the Baltic to the Mediterranean. It ranges in size from 10 to 20 inches, and has been taken to a length of 26 inches and a weight of 9 lbs. It is of a uniform dark brown colour above and white below, with the pectoral fins tipped with black. It is highly esteemed for its delicate flavour, and is caught in immense numbers by trawl-nets; the flesh is white and firm, and in good condition all the year round, except in February and March, when the fish is spawning. It feeds at night on the spawn and fry of other fishes, and on molluscs. The sole freely enters fresh waters, and sometimes remains in rivers throughout the year, breeding there. It may also be kept in good condition in fresh-water ponds. The LEMON SOLE (*Solea aurantiaca*) is another British species with a more southern range, being taken on the south coast of England in deeper water than the common sole. The Banded Sole (*Solea variegata*) is a small species, rarely more than 8 or 9 inches long, with very small pectoral fins. It is brownish-gray in colour, with dark irregular cross bands. It is esteemed for the table, and is taken on the south coast of England. The Dwarf Sole or Solenette (*Solea minuta*) is a still smaller species, being only 5 inches long, with rudimentary pectorals; it is reddish-brown in colour. It is taken on the Cornish and Devon coasts, but from its small size is not often brought to market.

SOLECISM (Gr. *solēkismos*), a grammatical term used by the later Greek and Roman writers, and by modern grammarians. It is defined by Sinius Capito as an unequal and improper arrangement of the parts of speech, that is, as a violation of the rules of syntax. Quintilian specifies four kinds of solecisms: the first consists in the addition of a superfluous word; the second, in leaving out one that is necessary; the third, in perverting the order of the words of a sentence; and the fourth, in using an improper form of a word. The ancients also used the word in a wider sense, to signify any kind of fault, error, or mistake in speaking, writing, or acting. Modern grammarians designate by solecism any word or expression which does not agree with the established usage of writing or speaking.

The term is derived from *Soloi*, a town of Cilicia, where the language of the Greek settlers had become corrupted by contact with barbarous tribes.

SO LEN. See RAZOR-FISH.

SOLENODON is a genus of mammals belonging to the order INSECTIVORA, of which it is the only representative in tropical America. Two species are known, one from Hayti and the other from Cuba. The Agouta (*Solenodon paradoxus*) was first described by Brandt in 1833 from the island of Hayti. It is upwards of 20 inches in length including the tail, which is 8 or 9 inches long. The muzzle is drawn out into a long slender proboscis, with the nostrils situated at the sides near the tip. The eyes are small, and the ears moderate and rounded. The body is covered with long stiff hairs; the muzzle has long whiskers, but the hinder end of the body and the tail are almost naked, the latter being tapering and ringed. The legs are

of moderate length, and the feet are covered only with short hair, and have five toes, armed with long curved compressed claws, longest on the fore feet. The mammae are placed far back on the groin. The dentition is peculiar. In front of the upper jaw are two large sharp incisors with a smaller one on each side; in the middle of the lower jaw are two very small incisors, and on each side a long conical incisor deeply grooved on the inner surface. There are forty teeth in all, four incisors, two canines, eight premolars, and six molars in each jaw. The agouta has the face, head, and back brown, becoming dark on the hinder part of the back; the sides of the head and neck are of a faint yellow-brown, mixed with rusty and gray; the belly and feet are tawny; the tail is grayish, becoming white towards the tip. Nothing is known of the habits of this species. The Cuban Solenodon (*Solenodon Cubanus*) is about the same size as the preceding species, but the fore part of the body is yellowish and covered with very long hairs, leaving the hinder part nearly bare and blackish in colour. The tail is stout and hairy. This species inhabits the mountains, and is nocturnal in its habits.

SOLENOID, a helix or coil of covered or insulated wire, as used in electro-magnetism, usually formed by winding stout copper wire on a cylinder of wood, which is afterwards withdrawn from within the solenoid. The ends are then turned into the coil, and both brought out together between the middle rings, so as to be easily attachable to the terminals of a battery, &c. If the wire is sufficiently stout and the coils are wound rather open, the wire is sometimes left uncovered. The word was coined by Ampère, from the Greek *solēn*, a tube.

SOLENT, the channel separating the Isle of Wight from the mainland of Hampshire, extends from Yarmouth to Spithead; average breadth, 1 to 2 miles, the narrowest part being a little west of Yarmouth, and the widest at the extreme north of the island. It has a very strong tidal current.

SOLEURE, a canton of Switzerland, is bounded N. by Basel, E. by Aargau, S. by Bern, and W. by Bern and France, and has an area of 353 square miles. The surface is crossed from south-west to north-east by the Jura Mountains, which form several parallel ridges, and cover the greater part of the canton. The principal valley is that of the Aar, which runs in the same direction eastward of the Jura. The highest summits in the canton are the Weissenstein and the Hasenmatt, which latter is about 4100 feet above the sea. The only important rivers are the Aar, Emmen, and Dunern. The soil is fertile, and the district is one of the most productive in Switzerland, especially in corn, fruit, and vegetables. The vine thrives only in certain localities. The mulberry tree is cultivated, flax is grown, and some silk is made. The pasturage, even in the rugged and hilly districts, is excellent; and the number of horned cattle, sheep, goats, pigs, and horses, is very great in proportion to the area. The horse fair of the town of Soleure is one of the most important in Switzerland. A considerable quantity of cheese is made, both of cows' and goats' milk. Part of the mountains are covered with timber trees, especially fir and beech. The canton abounds in iron mines, and the ore is smelted in the furnaces of St. Joseph, and worked at the ironworks of Klns. The other manufactures consist of leather, paper, watches, woollens, calico, hosiery, and kirschwasser, or cherry brandy. There are also quarries of marble and gypsum.

The government, once aristocratic, was considerably modified in 1831 and 1841, by a strong infusion of the democratic principle. The population at the census of 1880 was 80,424, of whom 66,000 were Roman Catholics.

SOLEURE or SOLOTHURN, a bishop's see and the capital of the canton, is situated on the Aar, at the foot of the Jura Mountains, 1320 feet above the sea, and is partly surrounded by walls. The river divides it into two un-

equal parts, which communicate by two wooden bridges. The population is 7000. The Cathedral of St. Ursinus is considered the finest church in Switzerland; the tower is 190 feet high. The other remarkable buildings are the town-house, which is very old; the arsenal, in which some curious armour of the old Switzers and Burgundians is stored; the theatre, the hospital, the fountain in the market-place, the former church of the Jesuits, and several convents. Soleure has a gymnasium, a lyceum, a faculty of theology, a public library, a botanical garden, and a cabinet of natural history, the latter containing a valuable collection of Jura fossils. The town is 16 miles from Bern by railway, and has some manufactures and a good transit trade. Near it are the baths of Weissenstein. The scenery in the neighbourhood is among the finest in Switzerland. The Polish patriot Kosciuszko resided at Soleure during the last two years of his life, which terminated on 16th October, 1817.

SOL-FA. See Tonic SOL-FA.

SOLFATARA (Ital. *solfà*, sulphur), the Italian name given to fissures in volcanic districts from which there is a continual exhalation of steam and various gases. Sulphurous acid, sulphuretted hydrogen, chloride of ammonia, and hydrochloric acid are most commonly formed, and their action one upon another, and upon the surrounding rocks, results in the formation of several valuable products, which it often becomes commercially profitable to collect. Sulphur, for example, is largely obtained from such sources. The solfatara usually marks one of the stages in the return to quiescence of a spot where volcanic activity has been exhibited. These gaping fissures, in fact, may be said to represent dying volcanoes.

SOLFEGGIO, in music, a vocal exercise sung to the syllables *Do, re, mi, fa, sol, la, si, do*, as representing the notes of the scale. *Solfeggi* are often confounded with *vocalizzi*, which latter are sung to the syllable *la* only, and in fact most modern solfeggi are truly vocalizzi.

SOLFERRINO, a village of Brescia, in Northern Italy, 20 miles N.W. of Mantua, situated on a considerable hill, crowned by a tower (*Spia d'Italia*, the Spy of Italy), which overlooks the whole of the Lombardy plain. Here was fought the great battle between the French and Italians, under the Emperor Napoleon and King Victor Emmanuel, and the Austrians, under the Emperor Francis Joseph and Count Giulii, 21th June, 1859, in which the latter were totally defeated. The Austrians lost 630 officers and 19,311 soldiers; the allies, eight generals, 936 officers, and 17,305 killed and wounded. Preliminaries of peace were afterwards signed at Villafranca, 12th July.

SOLICITOR-GENERAL is one of the law officers of the crown. He assists the attorney-general, and acts as his deputy when occasion requires. On him generally devolves the maintenance of the rights of the crown in revenue cases, patent causes, &c. [See ATTORNEY-GENERAL.] There is also a solicitor-general for Scotland, who ranks next in dignity to the lord advocate, and another for Ireland, who stands in the same relation to the attorney-general for that country.

SOLID ANGLE, a name given to the idea of opening conveyed by three planes which meet at a point.

SOLID, SOLIDITY, in physics. A solid body is one which is composed of matter so connected together that the relative positions of its parts cannot be altered without the application of sensible force. Solidity denotes frequently that state of a body, but for the strict sense of the word see IMPENETRABILITY.

SOLID, SUPERFICIAL, AND LINEAR DIMENSIONS. A solid, a surface, and a line, when they come to be the objects of arithmetic, are things as distinct as a weight and a time. Length can only measure length, a surface only a surface, a solid only a solid. Reasons of arithmetical convenience, not of necessity, make it advis-

able that whatever length may be chosen to measure length, the square on that length should be the surface by which surface is measured, and the cube on that length the solid by which solidity is measured. Unfortunately, if a foot be the measure of length, the square on a foot and the cube on a foot have no other name than *square foot* and *cube foot*. The farmer with his acres, and the distiller with his gallons, have an advantage which is denied to the young mathematician. Ask the first how many acres make a gallon, and the second how many gallons make an acre, and both would laugh at the question; the third is allowed an indistinct conception of measuring surfaces and solids in feet or inches as if they were lines, from the occurrence of the same word in all his measures.

Length is said to be a quantity of one dimension, surface of two, and solidity of three. The right line, the right surface or rectangle, and the right solid or rectangular parallelepiped (the figure of a box, a die, a plank, a beam, &c.), are the implements of mensuration. Every surface must be reduced to the second form, and every solid to the third, before it can be measured. The two fundamental theorems by which measurement becomes practicable are as follows:—

1. The numbers of the linear units in the two sides of a rectangle, being multiplied together, give the number of superficial units, square units, or squares on the linear units, which the rectangle contains. Thus a rectangle of $2\frac{1}{2}$ by $4\frac{1}{3}$ feet contains $\frac{5}{2} \times \frac{13}{3}$, or $\frac{65}{6}$, or $10\frac{5}{6}$ square feet.

2. The numbers of linear units in the length, breadth, and thickness of a right solid being multiplied together give the number of solid or cubic units, or cubes on the linear unit which the right solid contains. Thus a plank of $2\frac{1}{4}$ inches broad, $1\frac{1}{2}$ inch thick, and $10\frac{1}{2}$ inches long, contains $\frac{9}{4} \times \frac{3}{2} \times \frac{31}{8}$, or $\frac{279}{8}$, or $34\frac{3}{8}$ cubic inches.

SOLID, SURFACE, LINE, POINT, in geometry. According to Euclid a point has no dimensions; a line, length only; a surface, length and breadth; a solid, length, breadth, and thickness.

Space being distinctly conceived, parts of space become perfectly intelligible. Hence arises the notion of a boundary separating one part of space from the rest. That a material object, a desk or an inkstand, occupies a certain portion of space, separated by a boundary from all that is external, needs no explanation: this boundary is called surface, and possesses none of the solidity either of the desk or inkstand, or of the external space. Surface itself, when distinctly understood, is capable of division into parts, and the boundary which separates two parts of a surface has none of the surface, either on one side or the other: it therefore presents length only to the imagination. Again, length itself is capable of division into parts: the boundaries do not possess any portion of length, either on one side or the other; they are only partition marks or points. Euclid reverses the order of our explanation, requiring first the conception of a point, then of a line, then of a surface, then of a solid.

It matters nothing that the point, line, and surface are mechanical impossibilities, that no point or line, if they actually existed, could reflect light to show them, and that no surface could continue to exist for any perceptible time, even supposing it to have one moment of existence.

There is, it is true, one circumstance in which the pupil may acquire a permanently false notion of the object of geometry. If an instructor should require what is called a very well-drawn figure in every case, with very thin *lines* and very small *points*, he may perhaps succeed in giving the learner some idea that geometry consists in that approach to accuracy which constitutes practical excellence

in the applications of the science. No idea can be more false; let the good line be examined under a microscope, and it is seen to be a solid mound of blacklead or ink, as the case may be. Hence it is perhaps desirable that the demonstrations should be frequently conducted with what are called ill-drawn figures, in order that no reliance may be placed on the diagram, further than as to serving to remind the student of the ideal conception which is the real object of his demonstration. This of course is recommended without prejudice to his learning the accurate use of the ruler and compasses for another distinct purpose, namely, the intention of producing avowedly approximate results.

It is to be noted that these definitions, so called, are in Euclid more than definitions. They appeal to conceptions supposed to exist in words which are considered sufficient not to give, but to recall the necessary ideas.

SOLIDA GO is a genus of plants belonging to the order Compositæ and the tribe Asteroideæ. *Solidago virgaurea* (golden rod) is a native of the woods and thickets of Great Britain, and was formerly much used in medicine. Its leaves and flowers are said to be aperient, and it has been employed for internal hæmorrhages. It is astringent and tonic. It grows to a height of 2 feet, with an erect scarcely branching stem and golden-yellow flower-heads. About eighty species have been described, many of which are frequently cultivated in shruberies.

SOLIDIFICATION, the act of becoming solid, as when water becomes ice, or carbonic acid gas is frozen into carbonic acid snow. It is always accompanied by loss of temperature, but the change (not necessarily decrease) of volume is less, or usually smaller than in liquids, but is most marked in asphaltum, and in a very few others is larger. Solidification always takes place at the same temperature for the body, a temperature which varies for different bodies; and this temperature remains unaltered, even when the process of solidification notwithstanding the heat which is evolved. The point of solidification (or freezing point) is of course exactly the same with the point of fusion (or melting point), and the same process is equally regarded from opposite standpoints. It follows that, if a body cooled below its freezing point cannot be cooled further, it has actually been lowered 20° C. below zero by great pains being taken to keep it still. The least point of introduction of a solid body causes heat to be evolved, and the temperature rises to the freezing point. This experiment is very striking, and is quite easily performed on a less extent with the ordinary freezing mixtures.

SOLIDUS GULA TA. See LOTTERY.

SOLIDUS, the name of the famous *£ s. d.* of *dro, solidi, denari* of an account books, was late in coin. The word *solidus* was first adopted, and probably was used for a coin which represented the value of a solidus, or the coins in one pound. The *£ 11* AUREUS was often called *solidus*, in contrast to the half and lesser pieces. Under the emperor Diocletian there were forty *solidi* to the pound, and the *solidus* of the value was almost exactly a guinea of the present money, that is, the number was raised to forty-three, and the *solidus* was over a guinea and less in value, until the Emperor Valentinian decreed, in 367, that the *solidus* of gold should be the seventy-second part of a pound, and that was the standard to the decline of the empire. The *denarius*, down to the time of Pippin, used this Roman standard, but still further debased it to eighty-seven to the pound weight of gold, considerably less than half its original value. Pippin suppressed it, but his son, Charles the Great, used the same name for a *solidus* of silver, one-twentieth of a pound weight of the metal, when he struck, and which had been for some time used by merchants as a money of account, although there had been hitherto no coin to represent it. Thus we get our *solidus* or shilling, the twentieth of a pound; and thus also are the *solidi* of France and Italy, though sunk much lower in value during

the variations of ages than the English shilling, the twentieths of their pounds also—namely, the *sou* of France the twentieth of the *livre* (now called franc), and the *soldo* of Italy the twentieth of the *lira*. Both *sou* and *soldo* are worth not quite one halfpenny.

SOLIMAN or **SULEIMAN I.** (surnamed by the Turks *Kanouni*, or the Legislator, and by European writers the Magnificent), the tenth and greatest of the Ottoman sultans, succeeded his father Selim I. in 1520, in the twenty-seventh year of his age. His first exploit was the crushing of a formidable revolt of the Egyptian Memluks, and his next an invasion of Hungary (1521), in which he captured Belgrade. In the following year he took Rhodes from the Knights Hospitallers of St. John, who later found a new home in Malta. In 1526 Hungary was again invaded; the king, Louis II., and nearly all his army, were slain in the fatal battle of Mohacz, and the whole kingdom was overrun by the Turks. The Hungarian crown was conferred by Soliman on John Zapolski, but the rival pretensions of Ferdinand of Austria kindled the first of the long wars between the sultans and the German emperors; and in 1529 Vienna was besieged without success by Soliman in person. In 1533, partly to spite the German emperor, Charles V., who had foiled him in the course of the Hungarian wars, Soliman made the famous treaty with Francis I. of France, throwing open the Levant to the French traders alone, which has been the parent of fruitless strife ever since. The death of John Zapolski (1541) wrought a fresh change in the affairs of Hungary, great part of which was seized by the Turks. Buda became the seat of a pashalik; and the war continued, generally to the advantage of the sultan, till a truce was concluded in 1547, by which Austria agreed to pay a tribute of 30,000 ducats for her remaining possessions in Hungary. War again broke out in 1552, and Transylvania was subdued and made a pashalik under the Porte. But the mutual glories of Soliman were clouded by domestic dissensions. His eldest son, Mustapha, had been put to death in 1553, at the instigation of his stepmother Roxalana, and the jealousies of the two surviving princes, Selim and Bayezid, having ended in the rebellion of the latter, he was defeated and murdered, together with his children (1561).

The united fleets of the Porte and of Barbary had ruled the Mediterranean since the battle of Djorbeh in 1560, but they were repulsed with great loss at the Siege of Malta (1565) by the heroism of the grand-master of the Knights of St. John, John de la Valetta. The war in Hungary meantime continued, and in 1566 Soliman headed his armies for the last time for its invasion; but he died in his tent before the walls of Szigeth, 5th September, 1566, the day before the capture of the town. His only surviving son, Selim II., succeeded him.

Soliman was not less distinguished as a patron of literature and the arts than as a warrior and a legislator. He was a poet of no mean rank, and the encouragement which he afforded to the employment of the Turkish language forms an era in the literature of that country.

SOLITAIRE. Even so late as the middle of the seventeenth century certain wingless birds, of strange aspect, inhabited the islands of Mauritius, Rodriguez, and Bourbon. These now extinct birds were formerly, and even at a later period, regarded by naturalists as referable to one species, viz. the *Dodo* (*Didus ineptus*); but there is now reason to believe that three or four species, perhaps even more, distinct from each other, inhabited these islands respectively; of these one was the Solitaire (*Pezophaps solitaria*), which appears to have been confined to the island of Rodriguez. This island, which is about 15 miles long by 6 broad, is situated about 300 miles to the east of Mauritius. It appears to have remained in a desert and uninhabited condition until 1691, when a party of French Protestant refugees settled upon the island and remained

there for two years. Their commander, François Leguat, a man of intelligence and education, has left a highly interesting account of their adventures and of the various productions of the island, among which the solitaire takes a conspicuous place.

According to Leguat the solitaire was a large bird, the males sometimes weighing 45 lbs.; in appearance rather like a turkey, but taller and with a proportionately longer neck. The wings were small and useless for flight, but employed as weapons of defence. Its name was due to its solitary habits. The flesh was good for food. The general truth of Leguat's narrative has been established by the discovery in some abundance of the bones of this bird now extinct; and the British Museum possesses nearly complete skeletons brought home by the Transit of Venus Expedition. The solitaire was nearly allied to the Dodo (*Didus*), and belonged to the order of Pigeons (*Columbæ*).

SOLMIZATION. See HEXACHORD.

SO'LO (Ital., alone), any musical passage sung or played entirely alone, or supported by an accompaniment strictly subordinate to the solo part.

SOLOMON (Heb. *Shlōmō*, *Salomo*, *Sulīman*, from *Shalom*, peace), after his father, the most famous king of Israel, was the second son of David and Bathsheba, and was born about B.C. 1033. He was educated under the care of Nathan the prophet, who named him Jedijah, "Beloved of Jah," and after the revolt and death of Adonijah, David appears to have pledged his word to Bathsheba that although Adonijah was the direct heir, Solomon should be his successor. The feebleness of David's old age, however, tempted Adonijah to seize upon the throne, and being assisted in his attempt by Joab the commander of the army, and Abiathar the high priest, he invited all the members of his party to a solemn feast, with the view of proclaiming himself king. But meantime a counterplot had been formed by Nathan, Zadok the other chief priest, Benaiah the rival of Joab, and Bathsheba, and through their influence Solomon was at once proclaimed king, to the complete frustration of the conspiracy of Adonijah. This took place about B.C. 1015, and a few months after the event, by the death of David, Solomon found himself the sole occupant of the throne. The opening of the king's reign was attended by the slaughter of Adonijah and Joab, and the substitution of Zadok for Abiathar, Shimei, an old enemy of David, being at first spared, but afterwards put to death, with the result that "the kingdom was established in the hand of Solomon." The position to which Solomon had succeeded was unique in the history of Israel. By the strife and conflict of the preceding generation, and the remarkable qualities of David as leader and ruler, the people had been welded into one compact nation, their influence had been extended over many of the surrounding peoples, while the plunder taken in the successful conquests of the Israelites had allowed them to secure an immense accumulation of wealth. Hence Solomon was enabled to display a state of magnificence greater than that attained by any other king of Israel, while his reign marks the period of the greatest extent and political influence of the nation. The first act of the foreign policy of the king was the conclusion of an alliance with the King of Egypt, whose daughter he married, and he subsequently formed an alliance with Hiram, king of Tyre, which had important social and commercial results. By his internal policy the kingdom was divided into provinces, and a regular system of taxation was imposed upon his own people, the remnant of the earlier races which they had supplanted being reduced to the condition of slaves, and sent to labour in the quarries and forests of Lebanon. In the fourth year of his reign he commenced the erection of the Temple of Jehovah, the work being completed in seven and a half years, and though he afterwards erected buildings of greater magnificence, and temples to Chemosh and Molech,

it is this work which above all others has raised the reputation of Solomon among his own people. Second only to this, however, is his reputation for wisdom and wealth. Concerning the former, the author of 1 Kings iv. 29-34, places Solomon first among the wise men of the earth, and declares that the fame of his wisdom brought visitors from among all nations and ambassadors from all the kings of the world. He also makes him the author of 3000 proverbs and 1005 poems, but of the former only a few have been preserved, while the latter appear to have passed wholly into oblivion. His reputation for wisdom, which was so widespread during his reign, has since grown to vast dimensions in the imaginative stories of the East, and some of the legends preserved by the Persians and Arabs are of the most extravagant and fantastic character. Concerning his wealth, while it is impossible to reduce to modern figures the amount of his inherited treasure and revenue, the accounts given being uncertain and divergent (compare, for instance, 1 Chron. xxi. 14, and xxix. 4), it is certain that it reached dimensions which captivated the imagination of his own people as well as that of surrounding nations, (1 Kings x. 14, 29). In consequence of his alliance with Hiram, Joppa was made a seaport on the Mediterranean, and Solomon's men joined the Phoenicians in their trading voyages to Europe, while his possessions on the Egean coast enabled him to offer to his allies a new world of commerce by the way of the Red Sea and the Indian Ocean. The new commerce seems to have been chiefly retained as a royal monopoly, and to the wealth it brought was added the amounts derived from internal taxation and the tribute paid by the subject princes, whose "princely" were brought in at a regular rate year by year (1 Kings x. 25). Great as was his revenue, however, his passion for building and display caused his rule to become harsh, oppressive, and exhausting to his people, and prepared the way for the disruption of the kingdom which subsequently took place. The closing years of his reign were marked by the erection of temples to other gods than the God of Israel, and by the rebellion of Hadad the Edomite, Rezon, king of Syria, and Jeroboam the son of Nebat, who received protection and encouragement from Solomon's former allies, the Egyptians. His enemies, though troublesome, seem however to have been unable to seriously disturb his position, and he died in his capital B.C. 975, after a reign of forty years (1 Kings xi. 42, 43; 2 Chron. ix. 39, 34). As previously observed, Solomon has always had an extensive fabulous reputation in the East. There is probably some foundation for the story that he practised magic and sorcery, for these ever had a great fascination for the Israelites, and the Arabs still place Solomon at the head of those who have ruled the unseen djinns and spirits of the earth and waters. At Shiraz the Persians pointed out the tomb of his mother, and they declared that Persepolis had been built by djinns at his command. Many of the Arab traditions have been collected by Lane ("Thousand and One Nights"), and many legendary accounts are recorded in Weil's "Biblical Legends." An admirable exposition of Solomon's reign and character is to be found in Stanley's "Lectures on the Jewish Church" (second series, London, 1865).

SOLOMON'S SEAL (*Polygonatum*) is a genus of plants belonging to the order LILIACEÆ. The Common Solomon's Seal (*Polygonatum multiflorum*) has a creeping root-stock, which sends up a leafy stem to the height of 2 or 3 feet, of which the lower half is bare of leaves and the upper bears numerous broad shortly-stalked leaves. From the axils of the leaves spring the slender flower-stalks bearing the drooping greenish-white flowers in clusters of two to four; the perianth is cylindrical, six-cleft at the mouth, with the six stamens inserted near the middle of the tube. The flowers are succeeded by small bluish-black berries. The Solomon's seal occurs in woods in many parts of England, but is nowhere common; it has become naturalized

in Scotland and Ireland. It flowers in May and June. Still rarer British species are *Polygonatum verticillatum*, which is found in Northumberland, Perthshire, and Fofar, flowering in June and July, and having its leaves sessile and in whorls; and *Polygonatum officinale*, which is found on wooded limestone cliffs in a few places in England, smaller than the common species, with more leathery leaves and larger solitary fragrant flowers. All three species are found in Europe and Northern Asia.

SOLON (always thus accented in England, although the name in Greek, *Solón*, certainly demands the accent on the second syllable) was a descendant of the royal house of Kodros, and was born at Athens about B.C. 638. In his youth he visited several countries, and he probably returned to Athens soon after the island of Salamis had been taken from Athens by the Megarians, and when the ensuing war had caused such losses that a decree was made that any one who ventured to propose its continuance or renewal should be punished with death.

Solon being endowed with considerable poetical talents, composed an elegy upon the loss of Salamis, and assuming the appearance of a madman, rushed into the Agora reciting his poem. The trick succeeded, the Athenians repealed the law respecting Salamis, and resolved on the recovery of the island. The poet was placed at the head of the Athenian forces, and led them to victory.

In consequence of the manners of the friends of Kulon, who had taken sanctuary in the temples and at the altars of the gods, the republic had now for some time been divided between two factions. A part of the Athenians were engaged against Megakles and his associates for their violation of all religious feelings in this sad outbreak, and Kulon's surviving partisans did then utmost to foster this hostility against their enemies. Solon, who appears to have belonged to neither party, persuaded the Megaklids to submit their case to a commission of nobles, whose decision was that they must leave the country.

Notwithstanding, the party feuds continued to rage, and the only remedy was a reform of the constitution. Solon appeared to be the only man who was impartial and skilful enough to mediate between the hostile parties. In the year B.C. 594 he was invested with the office of archon, and empowered to frame a new code of laws.

His first measure was to relieve, by a kind of general insolvent act, those who were land pressed by debt. He established a remission of the rate of interest (which was probably made retrospective), and also lowered the standard of the silver coinage in such a manner that seventy three old drachmæ became worth a hundred new ones. In this manner if a debtor of one hundred old drachmæ paid only seventy three, his creditor lost 27 per cent. Those citizens who had been enslaved by their creditors were restored to freedom. Finally, the law which gave to the creditor a right to the person of his insolvent debtor was abolished. Solon now proceeded to the second and more difficult part of his task. The first thing he did was to abolish the bloody law of Drakon, with the exception of those relating to homicide. The characteristic feature of his new constitution was, that he substituted property for birth as a title to the honours and offices of the state. The change brought about by this new standard could not at first be great, as the cupatiots or nobles were the wealthiest citizens. According to their property, he divided the whole population of Attica into four classes, and regulated their political rights and duties according to the amount of their income from their landed property. The fourth class, whose income was below 200 medimni, were excluded from all offices of the state, but they had the right of voting in the popular assembly and the exercise of the judicial power. They also formed the light infantry in the armies. The archonship and other great civil and military offices, which had before been held by the nobles alone, became now acces-

sible to all the citizens contained in the first class whose annual income reached 500 medimni, while the second and third classes had access to all the minor offices. The public burdens were distributed according to the classes; the contributions to the necessities of the state were for the lower classes proportionately lighter, and the fourth class was altogether exempted from direct taxes.

Two other institutions, which were intended as bulwarks against democratical extravagance, the Senate of 400 and the Council of Areiopagos, are almost unanimously ascribed to Solon. No measures could originate in the latter, the popular assembly, and its discussions were confined to such measures as had been prepared by the senate. Though the political power of the assembly was limited, the judicial power with which Solon invested it was considerable. Out of the popular assembly 6000 men above the age of thirty were chosen every year by lot, to form a supreme court of justice called the Héchaia, to which appeals were made from the sentence of magistrates, and which had in certain cases to take cognizance, independently of any other court, and in subsequent times assumed all judicial power in the state.

When his legislation was completed, Solon is said to have asked permission to leave Athens for ten years, hoping that during this period the people would become familiar with their new institutions. He is said to have visited Egypt, Cyprus, and Asia Minor.

The beautiful story of the interview which Solon had with Cræsus, king of Lydia (whom he cautioned not to boast of his marvellous good fortune, as no man could positively be said to be fortunate while yet the end of his life was unknown), which is told by Herodotus, Plutarch, and others, is inconsistent with chronology; for Cræsus did not ascend the throne till twenty or thirty years later than the time at which the great legislator must have visited Asia Minor. On his return he found Athens again distracted by factions; the result of which was that Peisistratos, who saw that a strong hand was needed to restore order, seized upon the supreme power. Solon wisely withdrew into private life, but continued to assist his sagacious kinsman with his counsel. He probably died about 559 B.C. Solon was always considered by the Greeks as one of the sages or specially wise men. He was a poet as well as a legislator. The few remains of his poetry are distinguished by simplicity and vigour. They have been collected several times separately, and are printed in Bergk's "*Lyric Poetæ Græci*" (1813).

SOLPUGIDÆA is an order of the class ARACHNIDA. In this order the abdomen is long, cylindrical, segmented, and quite distinct from the cephalothorax, which is itself divided into a head and three thoracic segments. The body and limbs are covered with hairs. The head bears a pair of powerful chelicere, greatly inflated towards the base, and terminating in pincers; they are furnished with poison-glands. The second pair of appendages or pedipalpi are leg-like, but without claws, as are also the first pair of legs, which belong to the head. There are three pairs of long thoracic walking limbs. There are two large ocelli. The respiration is by tracheæ. These large arachnids live in warm sandy localities in the Old World. They are nocturnal in their habits, and prey chiefly upon insects, though lizards, small birds, and small mammals are attacked by some species. Cattle and sheep are also often severely bitten. The best known species belong to the genus *GALEODES*.

SOL'STICES (Lat. *solstitium*; from *sol*, sun, and *sto*, I stand), the points of the ecliptic which are highest above the equator, where the sun's motion in declination being imperceptible, the days remain sensibly unaltered in length for several days together, as they would always do if the sun absolutely stood still, whence the name. There are two solstices, one at midwinter and the other at midsummer.

SOLSTITIAL COLUME, a great circle of the heavens passing through the poles and also through the two solstitial points, cutting the heavenly sphere into two equal parts. (The equinoctial colure is exactly at right angles to the solstitial.) It is found figured in our *PLATE CONSTELLATIONS*. The term is from the Greek *kolouros* (imperfect), because some part of these circles is always below the horizon.

SOLUTION, the absorption of a solid or gaseous body in a liquid, which is termed the solvent or menstruum. Water is the universal solvent, and most substances are soluble in it to a certain extent. Alcohol is the best solvent for resinous bodies, and benzole or petroleum spirit for fats. The application of heat has an important influence on the solvent power of liquids; in most cases it increases it, and hence, when it is required to crystallize certain salts, they are dissolved in hot water, and the solvent power of the water diminishing as the solution cools, the salt is deposited in crystals. In some cases, however, heat diminishes the solvent power. Solution of solid bodies is usually accompanied by a fall of temperature, the heat becoming latent. This is the principle of freezing mixtures, the solution of salt in snow, for instance. When a solvent has taken up as much of any substance as it is capable of absorbing, the solution obtained is termed a saturated solution. That the change of form from solid to fluid is the result of chemical affinity, is shown by the fact that water which is saturated with one substance will take up another; thus a saturated solution of common salt will still dissolve sulphate of soda, and many substances are more soluble in saline solutions than in water.

SOLUTION, in mathematics. By the solution of a problem should be meant the method of finding that which the problem requires to be found; but the word is frequently understood to apply to the answer itself.

SOLWAY FRITH, an estuary or inlet of the sea, on the western side of the island of Great Britain, separating in one part England from Scotland. It extends inland from a line drawn between Rayberry Head; in Kirkcudbrightshire to St. Bees' Head, in Cumberland, 41 miles N.E. to Solway Moss, at the mouth of the Esk. The line between the above-mentioned headlands, which may be regarded as measuring the mouth or entrance of the frith, is more than 20 miles long. About 17 miles up, between Southernness Point, Kirkcudbrightshire, and Beekfoot, in Cumberland, the width is diminished to 7 miles: it afterwards expands, then again contracts, and 15 miles further up, between the mouth of the Annan, Dumfriesshire, and Bowness, in Cumberland, it is reduced to 2 miles: this continues to be the width of the estuary for the remaining 9 miles to its termination. Its most remarkable feature is the swiftness with which its tides ebb and flow, as Scott has noticed:—

"Love flows like the Solway, but ebbs like its tide."

The wave at spring-tides is from 3 to 6 feet high, and pours in at the rate of 8 to 10 miles an hour, occasionally inflicting serious damage on the shipping; while in receding it often leaves the channel so bare that a pedestrian may cross from the English to the Scottish shore. There are good salmon fisheries. A considerable part of the frith between Southernness Point and Allonby is occupied by broad sands, dry at low water, and intersected by the channels formed by the streams which flow into it. The frith is navigable through the greater part of its extent for vessels of 300 tons, and for those of 100 tons up to its furthest extremity.

At the head of Solway Frith is Solway Moss, a tract of bog, in Cumberland, about 7 miles in circumference, which burst in 1771 and overflowed several hundred acres of fertile land, sweeping away houses, trees, and about thirty

small villages in its black stream. By great exertion and expence the land was again brought into cultivation, and all trace of the catastrophe obliterated. Solway Moss is memorable for the defeat of the Scots in 1512. A body of 10,000 men under Lord Maxwell and the Earls of Cassilis and Glencairn entered England; but the leaders were corrupt and the men mutinous, and on being attacked by a force of 1400 English the whole army took to flight, leaving nearly 1000 prisoners, of whom 200 were lords, esquires, or gentlemen. Lord Maxwell, the commander-in-chief, was among them. James V. of Scotland is said to have died of vexation in consequence of this defeat, about a month after it took place.

SOMA'LI LAND, the country occupying the eastern horn or promontory of Africa. Zeilab and Berbera are the chief ports on the Gulf of Aden, and are occupied by British troops, a protectorate of the north coast having been declared in 1885. The Somali are a Hamite race, nearly akin to the ancient Egyptians, and are closely related to the Gallas, who dwell south of Abyssinia—with whom, however, they are in perpetual feud. They are a pastoral people, carrying arms and ever ready to use them. They are divided into tribes under sultans, and are not altogether barbarous. The interior of the country appears to be an elevated plateau, with vast tracts of stony, waterless desert but also with some fertile regions. About the centre of the promontory lies the country of Ogadayn. South of it is the rich valley of the Webbe Shebeyli ("leopard river"). The Somali breed immense numbers of camels for the sake of their flesh. The price of a camel in the markets is from eighteen to twenty-five dollars. Off Cape Guardafui lies Socotia. The southern Somali coast was taken under German protection, and the Italian government, in 1886, declared a protectorate over the whole promontory, taking the coast beyond the British territory (Berbera) on the north, and as far south as Washukh, where the Zanzibar claims begin. The country was explored by Mr. F. L. James. (See the *Proceedings of the Royal Geographical Society* for October, 1885.)

SOMERS, JOHN, Baron Somers of Evesham, a celebrated English statesman, was the son of an attorney, and was born at Worcester probably on 4th March, 1652. He was educated first at the cathedral school of Worcester and afterwards entered Trinity College, Oxford, where he resided five or six years after taking his bachelor's degree, publishing during this period several political pamphlets, and a variety of metrical and prose versions from classical authors. In 1669 he became a fellow of the Middle Temple, and in 1676 he was called to the bar, but he did not begin to practise until 1682. His first case of public interest occurred in 1683, and soon after this he became known as a rising young lawyer and a prominent member of the Whig party. He was associated with the Whig leaders in the negotiations which resulted in the coming over of the Prince of Orange, and under the new government preferments flowed fast upon him. In May, 1689, he was knighted and made solicitor-general, in 1692 he became attorney-general, in 1693 he was promoted to the office of lord keeper of the great seal, and in 1697 he was made lord chancellor and raised to the peerage. As one of the strongest friends of the king he became an object of enmity to the Tories, and after sundry ineffectual attempts had been made to fasten upon him a charge of maladministration, an unsuccessful motion was made in the House of Commons, 10th April, 1700, that the king should be requested to dismiss him. The same month, however, his absence through illness from the debates upon a measure distasteful to William was represented to the king to be from design, and on 17th April he deprived Somers of his office. In 1701, Tory influence having become predominant in the Lower House, an attempt was made to impeach Somers on fourteen distinct charges,

the most important of which referred to an illegal issue, at the king's request, of blank commissions under the great seal, for the purpose of negotiating foreign treaties. The affair ended, after many conferences between the two Houses, by the Commons declining to prosecute; and Somers, who had regained the favour of William, wrote for him the speech with which he opened his last Parliament, 31st December, 1701. On the accession of the Whigs to power, in 1708, Somers was appointed president of the council, and held the office until the return of Harley and the Tories in 1710. He took part in the debates in the House of Lords after this period, but the infirm state of his health prevented him from taking any prominent position, and he died from apoplexy, 26th April, 1716.

Lord Somers was a statesman of great ability and high integrity, a sound lawyer, and an eloquent speaker. He was also a discriminating patron of many of the literary and scientific men of his time, among whom were Newton, Locke, Bayle, and Addison, the last of whom dedicated to him the first volume of the *Spectator*. A collection of curious and rare pamphlets from his library was printed in 1748, in sixteen vols. 4to, under the title of the "Somers Tracts," a new edition being issued under the superintendence of Sir Walter Scott, in thirteen vols. 4to (1809-15). See "Life and Character of Lord Somers," by R. Cooksey (1791), and Campbell's "Lives of the Lord Chancellors."

SOMERSET HOUSE. See LONDON.

SOMERSETSHIRE, an English county, is bounded N. and W. by the Bristol Channel, N.E. by Gloucestershire, E. by Wiltshire, S.E. and S. by Dorsetshire, and S. and W. by Devonshire. The greatest length E. by N. to W. by S. is 79 miles; the greatest breadth at right angles to the length is 40 miles. A small detached portion of the county is entirely surrounded by Dorsetshire; it lies between Sherborne and Blandford. The area is 1,049,815 acres. The population in 1881 was 169,199.

Surface and Geology.—Somersetshire is a hilly county, but its undulating ranges are separated by low marshy flats, so that hilly as it is, it yet exceeds most counties in the extent of its fens. The north-eastern part is occupied by the oolite ridges round Bristol and Bath, through which the Avon runs. They are irregularly grouped, and stretch along the north-eastern border, from Pill on the Avon below Bristol, into Wiltshire; many of the valleys or "roadles" which separate them are drained by small streams flowing into the Avon. The principal summits in this part of the county are from 700 to 800 feet high.

The hills farther south, in the neighbourhood of Bath, and ranging east by Exmoor, Yeovil, and Dunster to Wellington, are of the oolite formations. The great oolite, the most important of these strata, which furnishes the finest Portland stone, is well known as Bath Stone, probably because it occurs at 140 to 150 feet. Masses of this rock are not situated on the slopes of the hills which it covers, covering the gravelly clays and fuller's earth, which with the marl, oolite and calcareous sand, constitute the greater number of the group, and form a terrace projecting into the low-lying valleys. The inferior oolite is extensive very near to Dunkey Hill and at Hamhill and Doubling, where it yields a good freestone. The coal measures, mountain limestone, and red sandstone belong to the carboniferous group of the Somersetshire and South Gloucestershire coal field, and occupy the northern part of the county, extending to the Mendip Hills, though covered in most places by more recent formations. In this field occur the important coal mines of Radstock and Bristol.

The Mendip Hills form a distinct range, stretching from west by north to east by south, and separated from the highlands of Bath and Bristol by the narrow valley of the

Yeo, a small stream which flows into the Bristol Channel near Weston. The cavern of Wookey Hole, and the defile of Cheddar Cliffs, with its long line of stupendous mural precipices, are among the most magnificent objects of this kind in Britain. The mineral treasures of the Mendips are important. Zinc, calamine, and lead are obtained abundantly in the central and western part of the range. Numerous coal pits lie about the villages north-west of Frome. The coal seams are all thin, seldom exceeding 3 feet. Iron and manganese are also worked in several places. The long low ridge of Pawlet or Polden Hill, and its spurs, form an offset from the eastern range between Castle Cary and Ilchester. It extends about 20 miles in a direction parallel to the Mendips, from which it is separated by a wide intervening fenny flat, drained by the Brue.

In the western part of the shire, running north-west from the neighbourhood of Taunton to Bridgewater Bay in the Bristol Channel, are the Quantock Hills, consisting of a mass of the Devonian or graywacke slate. The length of this picturesque heathery range is about 11 miles. Its greatest breadth is 5 or 6 miles. Will's Neck, one of the highest summits, is 1270 feet high, and its general elevation varies between 1000 and 1150 feet. The western declivity is steep and abrupt, but on the east the slope is gradual, and descends into those romantic valleys which have been celebrated by Coleridge and Wordsworth. The greater part of the county, west of the narrow tract of new red sandstone which separates the Quantock range from the principal district of the slate rocks, is occupied by an irregular hilly district, forming part of the wild moorlands of Exmoor Forest, which belong to the two counties of Devon and Somerset. It is chiefly occupied by the old red sandstone, or Devonian formation. Dunkery Beacon, the highest summit, is 1700 feet high. The limestone caves of Banwell, Wookey, and Uphall are remarkable for the number of miscellaneous animal bones which have been found in them. Mineral springs occur at Bath, Glastonbury, Alford, near Castle Cary, and Queen Camel, near Ilchester. Most, if not all of these, are found in a stratum of marl between the inferior oolite and the bas formations.

Coast Line.—The coast from the mouth of the Avon runs 15 or 16 miles south-west to Sand Point; thence 5 miles, in a southerly direction, to Brean Down, a hill of mountain limestone, precipitous on every side, and surrounded by the sea except at its eastern end, where a marshy flat connects it with the mainland. From Brean Down the coast extends south-west 10 miles to Little Stoke Point, and from this headland, which forms the extremity of Bridgewater Bay, it runs west 25 miles to the boundary of the county. The shores are generally flat, but in some parts, as between Portishead and Clevedon, and where the spurs of the Quantock range reach the coast west of Little Stoke Point, they rise into a bold and picturesque line of cliff. Some of the fossil saurians modelled at the Crystal Palace were found on one of these peaks, called North Hill.

Rivers, &c.—The general course of the rivers is to the north-west; the only material exception is in the case of the Tone, and the upper portion of the Bristol Avon. The larger streams (except the Tone) rise in the adjacent counties, and pass through the depressions which break the continuity of the bordering hills. The principal rivers are the Avon, the Parret, the Axe, and the Tone.

The Avon (Celtic *Alf*, *Aron*, water), distinguished from the Warwickshire river so called by the title of the *Lower Avon*, rises in Gloucestershire, on the eastern slope of the Cotswold Hills, and flows through Wiltshire to Bradford, below which it reaches Somersetshire, separating it from Gloucester. It has a course, on or within the border of the county, of 31 miles, and terminates in the Bristol Channel or estuary of the Severn. It is navigable for barges up to Bath (where it receives the Kennet and Avon

Canal, connecting it with the Thames), and to Bristol for sea-borne vessels, the largest of which, owing to the great rise of the tide (nearly 30 feet), reach the quays of the town without any difficulty, though they are situated 8 miles, following the winding of the channel, above its mouth. A part of the Avon is carried further south, in a deep cut, executed in 1801. At its mouth the spring tides usually rise 40 feet, and have been known to reach 50 feet. The Avon receives the Midford Brook above Bath, and the Chew at Keynsham. The Frome flows into it south of Bristol, where the joint channel has been converted into a floating basin. The Yeo, or Yow, rises at Compton Martin on the northern slope of the Mendip Hills, and flows north-west 13 miles between them and Broadfield Down into the Bristol Channel. The Axe rises in the Wookey Hole (more correctly *Okey*, from the Celtic *oga*, a cavern), on the southern side of the Mendip Hills, and flows north-west 21 miles through the flats at their feet; it is navigable to the village of Lower Weare, near Axbridge, about 11 miles above its mouth, but this distance has been shortened to 9 miles by one or two cuts. The Brue rises on the slope of the chalk mail and green-sand hill which separate Somersetshire and Dorsetshire, and flows westward by Bruton and Glastonbury, 35 miles, through the marshy level between the Mendip and the Polden Hills into the estuary of the Parret. It is not navigable.

The Parret, the principal river in the county, rises in the chalk downs at South Perrot, north of Beaminster, in Dorsetshire. It reaches the frontier of Somersetshire about a mile from its source, and flowing north for 15 miles, traverses the oolitic border hills by a depression near Crewkerne, and passes by South Petherton to Langport, receiving the Ilch on its left bank and the Yeo on the right. From Langport it flows north-west 12 miles, through a marshy country to Bridgewater, augmented midway between that town and Langport by the waters of the Tone. Below Bridgewater it pursues a sluggish and winding course of 16 miles into Bridgewater Bay, in the Bristol Channel, receiving the Cary on its right bank, and uniting near its outfall with the Brue. Its whole course is thus about 43 miles. The Ilch has its sources in the cretaceous formation between Chard and Crewkerne, and flows north and north-east by Ilminster, 15 or 16 miles into the Parret, through marshes which cover the lias formation. The Yeo or Yow rises amid the border hills near Milborne Port, and flows south and south-west, and then north-west 11 miles, through a pleasant and luxuriant valley, by way of Sherborne to Yeovil, receiving several streams from the Dorsetshire chalk downs on the left bank. From Yeovil it pursues a circuitous course for 8 miles N.N.W. to Ilchester, and thence for 7 miles W.N.W., making 26 miles in all, into the Parret at Langport. All this portion of its course lies through marshes, which overspread the lias and new red sandstone formations. The Tone rises in the southern slope of Brendon Hill, and flows 10 miles south to the border of Devonshire. It then turns east, and strikes across a fertile country for 23 miles, past Taunton into the Parret. The Cary rises near Castle Cary, and flows west to the Parret; its whole course is about 30 miles. The Yeo is navigable for 7 miles into the Parret at Langport. A little above that town the navigation of the Parret commences, and continues to its mouth. Ships of 200 tons can ascend to Bridgewater. The Tone is navigable from Taunton to its junction with the Parret, 10 or 11 miles. The river Exe has its source and the upper part of its course in the western extremity of Somersetshire, to which some of its first affluents belong, but its principal included in Devonshire.

The Great Western Railway enters Somersetshire near Bath, and runs through that city to Bristol, where it is connected with the Bristol and Exeter line. The county

is also traversed by the Wilts, Somerset, and Weymouth, Somerset and Corset, Bristol and Exeter, North Somerset, and Cheddar Valley railways; besides portions of the Midland and South-western systems. The occupations of the inhabitants are generally mining or agricultural; but silk and woollen stuffs, canvas, gloves, paper, brushes, glass, pottery, and iron wares are manufactured.

Agriculture.—Somersetshire possesses a fertile soil and mild climate. The hills are mostly cultivated or in profitable pasture. There is a fair proportion of woodland without any large forests. In some of the vales, such as the extensive vale of Taunton, the soil is of an exceedingly rich nature, and produces wheat and barley of superior quality. The pastures are famous for their cattle and sheep, and excellent butter and Cheddar cheese are made. The latter, from its superior quality, gives its name to a great portion of the cheese made in the county, and is reckoned by many to be the best made in England; the genuine Cheddar is consequently scarce, and bought up as soon as it is made. It is mainly produced on the rich grass farms in the neighbourhood of Cheddar, and each cheese averages in weight above 56 lbs. There are some extensive orchards in the centre and south east of the county, and large quantities of excellent cider are made in various parts, but especially in the vale of Taunton.

The cows are mostly of the Devon breed, but many short-horns are also to be found in the dairies. The oxen fattened are either Devons or Herefords and shorthorns. The sheep on the best lands are of the Leicester or South Down breeds, with crosses between these and the Cotswold. Many pigs are fattened, and very good bacon is cured; the breed is like the Hampshire and Berkshire, and has been improved by crossing with the Essex and Norfolk. Wild fowl and fish are abundant. The farm-horses are strong and active; and the newest improvements and agricultural systems have been generally adopted.

Somersetshire is divided into forty hundreds and 475 parishes. It constitutes the diocese of Bath and Wells, which is divided into three archdeaconries. The bishop's palace is at Wells. The county is in the western circuit, and the assizes are held at Taunton and Wells. Under the provisions of the Redistribution of Seats Act of 1885 the county is divided into seven divisions, each of which returns one member. Bath returns two members and Taunton one—making a total of ten representatives.

The dialect of the county, passing into Devon and Dorset, now much modified and confined chiefly to the rural districts, is very peculiar. Its distinctive features are the use of obsolete Old-English or Danish terms, and of obsolete forms of speech, with a deep intonation, and a vicarious mode of pronouncing some of the consonants. The *s* and *f* are converted into *z* and *v*, as in *Zummer*, *at* for Somerset, and *rather* for father. The sound of *d* is frequently given to *th*—thread being pronounced *dread* or *dird*, and thrash *drash*. It is common to meet with *ac'm*, *you're*, *they'm*, for we are, you are, they are. *Ize* is substituted for *I*, or for *he*, *her* for *she*; and *near* always takes the place of *was* and *were*. In the "Laxmoor Courtship," a dialect production of the last century, Mungery calls back her suitor to "zup a zip o' zider." A favourite specimen of grammar is the children's remark—"Her ain't a-chil o' we; us don't belong to she," when they were told of a woman calling them.

History and Antiquities.—In the earliest historical period this county is thought to have been inhabited by the Belgæ. In the Roman division of the island Somersetshire was included in the province of Britannia Prima. Roman antiquities have been found in considerable abundance at Bath, Ilchester, Shepton Mallet, Yeovil, and elsewhere, and several Roman camps and ancient forts are scattered throughout the county. Of Druidical antiquities Somersetshire possesses but few. The most important remains are at Stanton

Drew, 6 miles from Bristol. These consist of huge, shapeless blocks of stone, arranged in one irregular ellipse, and in three circles. The largest of the latter encompassed an area 300 feet in diameter, and its circumference is still marked by fourteen stones. The second formed a ring about 84 feet in diameter, and the third anciently consisted of twelve stones. This great Druidic temple corresponds in character with that of Abury, in Wiltshire. The chief Roman stations in Somerset were *Aque Solis*, or Bath, the waters of which were first used by that people; and *Ischalis*, or Ilchester. Under the Saxons this county was the seat of the West Saxon kingdom, and received its name, "the pleasant county," from the Saxon kings. Alfred, when driven from his throne, found security in the marshes of the Isle of Athelney, at the junction of the Tone and Parret.

Of the middle ages there are several memorials, especially monastic ruins; some at Bath, and others at Glastonbury, Lichster, Banwell, and Old Cleeve. The only important castellated remains are Farloagh or Farley Castle, between Bath and Trowbridge in Wiltshire; Nunney, near Frome, erected by one St. Elias de la Mere, *tempore* Edward III.; Dunster and Stogumsey; and Walton Castle, near Clevedon, once a hunting-seat of the Clevedon lords. The ruins of Farloagh are very picturesque. The castle belonged to the family of the Hungerfords from 1367 to 1689, and its Early English chapel is still preserved. There are also remains of Badgewater and Taunton castles. The county was the principal scene of Monmouth's rebellion in 1685, the suppression of which was followed by the most fearful severities. The Earl of Feversham hanged twenty-two men at Bridgewater on the evening of the battle of Sedgemoor (6th July) without any form of trial. A special commission, with Lord Chief-justice Jeffreys at its head, was sent into the west; and a great number of persons were condemned and executed at Dorchester, Exeter, and especially at Taunton and Wells. The prisoners for trial in this county alone were above 1000, and of these at least 240 were executed. The sentences were carried into effect in thirty-six different towns and villages, among which the offenders were distributed. At Taunton 385 persons were transported and nearly seven hanged.

SOMERTON, a small town of England, in the county of Somerset, 11 miles S.S.W. of Wells, and 158 from London, being 5 miles distant from the Langport station on the Bristol and Exeter Railway. The town consists of some small streets, with houses mostly of blue-lime stone, and has a town-hall and an ancient church. The population in 1881 was 1917. Though supposed to have been a Roman station, there is no information respecting it till the Heptarchy, when it was a considerable fortified town, and the residence of Ina and other kings of Wessex. Hence it is found in Saxon antiquaries, including parts of the ancient walls, a round tower, and the castle, in which John, king of France, was imprisoned subsequently to his capture at the battle of Poitiers.

SOMERVILLE HALL, OXFORD, is one of the modern seats of learning, founded especially for women who desire to attend the great universities; Girtton College and Newnham Hall at Cambridge being other well-known examples. Somerville Hall, named after the greatest lady of science of modern days, Mrs. Somerville, was founded in 1879, "for the reception of students coming from a distance to attend the lectures of the Oxford Association for the Promotion of the Higher Education of Women." These lectures are in many cases the same as those delivered to the undergraduates of the university itself, and when they are not so they are of equal difficulty and importance. The university at the present time does not recognize women-students, although Cambridge (1881) and London (1878) do so, consequently the latter have to be taught and examined by the courtesy of the professors.

Students must be at least seventeen years of age. All

religious denominations are allowed; but students are expected to attend daily prayers, and to go to some place of worship on Sunday. The general life of the hall is modelled as closely as possible on the English family life. The terms of residence coincide with the university terms, and the fees are twenty guineas a term, covering board and lodging. There are four exhibitions of £25 each, tenable for two years by students who are preparing to become teachers, and there is a Mary Somerville scholarship (open) of £30 a year for mathematics, tenable for three years, the holder to reside at Somerville Hall. The chairman in 1887 was the Rev. C. J. Percival, President of Trinity College, Oxford (an example of the new and broad views held on the subject of women-students by the brightest intellects of the famous university), the lady principal was Miss M. Shaw-Lefevre, and the secretary the Hon. Mrs. Harcourt, Cowley, Oxon. The hall is governed by a council of fourteen ladies and gentlemen.

SOMERVILLE, MRS. MARY, a celebrated British physicist, born in Roxburghshire, Scotland, 26th December, 1780, was the daughter of Vice-Admiral Sir William Fairfax, who served at Camperdown as flag-captain to Lord Duncan. She was remarkable in early life for the deep and intelligent interest she took in all branches of natural and mathematical science, and though she received but scant encouragement from her father and first husband, Mr. Samuel Greig, whom she married in 1801, she acquired, chiefly through her own exertions, a thorough education in mathematics. Left a widow in 1807, she returned to her father's house in Buntisland, and in 1812 she married her cousin, William Somerville, M.D., who in 1817 removed to London. Her second husband sympathized thoroughly with her intellectual pursuits, and by his aid she gained access to the best scientific society of the day, numbering among her friends and correspondents Laplace, Arago, Cuvier, Gay-Lussac, Herschel, Whewell, Babbage, and many others. In 1826 an account of some experiments made by her on the magnetic influence of the violet rays of the solar spectrum were published in the *Philosophical Transactions*, and soon after this she was induced by Lord Brougham to prepare a popular summary of the "*Mécanique Céleste*" of Laplace for the "Library of Useful Knowledge." The work proved in the end too voluminous for its original destination, and it was published separately in 1831 under the title of the "*Mechanism of the Heavens*" (8vo, Cambridge). This work procured Mrs. Somerville's election as an honorary member of the Royal Society, her bust by Chantrey being placed in their hall. In 1834 she published "The Connection of the Physical Sciences," an important work which has since passed through nine editions; and the following year she received from government an annual pension of £200, afterwards increased to £300. Soon afterwards she went to Italy on account of the health of her husband, and during the rest of her life she resided chiefly in Florence, Rome, and Naples. Her next great work, "Physical Geography," was published in 1848, and her last, "Molecular and Microscopic Science," appeared in 1869. She was a member of many foreign learned societies, and in 1869 received the Victoria medal of the Royal Geographical Society, and the first gold medal ever awarded by the Italian Geographical Society. After her husband's death, in 1860, she retired to Naples, where she died 29th November, 1872. To the end of her long life she retained wonderful mental vigour, continuing her studies in the higher mathematics up to the last, one of the latest of her occupations being the revision and completion of a treatise on the "Theory of Differences." During the closing years of her life she noted down some recollections of her life, which were edited by her daughter, and published under the title "Personal Recollections from Early Life to Old Age, of Mary Somerville" (8vo, London, 1873).

SOMME, a department in France formed out of the province of Picardy, is bounded N. by Pas-de-Calais, E. by Nord and Aisne, S. by Oise and Seine-Inférieure, and W. by the English Channel. Its greatest length is about 80 miles, and its greatest breadth about 47. The area is 2379 square miles, and the population in 1881 was 550,837. The coast-line of the department, extending about 25 miles between the mouths of the Authie and the Bresle, is broken into two parts by the estuary of the Somme, to the north of which the land, consisting of alluvial soil, lies low, and is protected from the sea by a series of sand-hills, while to the south of it commences the range of high chalk cliffs that extends along the southern coast of the Channel as far as Havre. The surface may be described as a great level plain sloping from south-east to north-west, except in the north of the department, in the neighbourhood of Abbeville, and at some other points where there are hills of considerable height. The soil consists mostly of a sandy clay resting upon chalk, and is not naturally very fertile; nevertheless a great quantity of grain is raised. The valleys (especially that of the Somme) contain marshes, and generally peat also, whence abundance of turf fuel is dug, the necessity for which will be understood if we consider the small extent, and in most instances the great distance of the forests.

The valley of the Somme has become famous in connection with the question of the antiquity of man. Numerous flint implements have been found in the high and low level gravels. The former lie at a height of more than 100 feet, in some instances above the latter, which occur further down, and in the bed of the river. The products include all the cereal grains (of which a considerable surplus is exported), hemp, lint, oleaginous seeds, beet-root, pot-herbs, dyeing and medicinal plants, grass seeds, and apples and loaves for making cider and beer, which are the chief beverages of the inhabitants. A large number of useful farm horses, horned cattle, and pigs are reared. Poultry are abundant and excellent. Sheep are not very numerous, and those that exist are for the most part ill-fed and lean, but their wool is pretty good. Wolves are still found, and there are a few wild boars. A great deal of hemp and flax is grown in the north of the department. The Santerre district south of the Somme, between Péronne, Montdidier, and Amiens, the capital, is a fine wheat country. Wine of an inferior quality is made to a small extent. The climate resembles that of the south of England, but it is somewhat colder in winter; it is healthy, except in the neighbourhood of the undrained marshes in the valley of the Somme. The minerals are building stone, paving flints, marble, chalk, vitreous earth, potter's clay, and gypsum; coal has been found near Doullens, but no mines are worked. The manufactures are important, comprising fine and coarse woollen cloths, cotton fabrics of every description; also velvets, silks, linen, lawn, cambric, gauze, cashmere shawls, canvas, carpets, muslins, hosiery, ropes; locks, hardware, nails, leather, paper, oil, soap, glue, glass, pottery, mineral acids and other chemical products. The department has several bleachworks, large cotton-mills driven by steam machinery, besides beet-root sugar refineries, numerous dye-houses, oil and tan mills, &c.

The district is named from its principal river, the Somme, which rises in the department of Aisne, north-east of St. Quentin, past which it flows to the south-west; it afterwards runs in a general westerly direction past Ham, Péronne, Amiens, and Abbeville, and enters the English Channel by a wide embouchure below St. Valéry, after a course of about 120 miles. The river is navigable naturally only from Amiens to its mouth, but the navigation has been extended above that city almost to its source by improving the bed, and chiefly by lateral canalization. The Somme, or Angoulême Canal, as it used to be called, joins the St. Quentin Canal, thus giving the department a water com-

munication with the Oise, the Seine, and the Scheldt. [See AISNE.] The Avre, which joins the Somme from the left bank at Amiens, is navigable for about 12 miles. The only other rivers worth naming are the Authie, which forms part of the northern boundary, and the Bresle, which flows between this department and that of Seine-Inférieure. The department is divided into the five arrondissements of—Amiens, Doullens, Montdidier, Péronne, and Abbeville.

SOMNAMBULISM, a word of modern origin, which means strictly and etymologically *sleep-walking*, it is, however, generally used in a more extended signification to comprehend all the phenomena that take place when a person apparently insensible to external objects, acts as if he were in a state of consciousness. Its phenomena may be divided into essential (or proper) somnambulism, which arises from some particular disposition of the nervous system in persons who in other respects apparently enjoy perfect health; symptomatic (or morbid) somnambulism, which occurs in the course of certain diseases; and artificial somnambulism which is occasioned by the proceedings employed in mesmerism.

Somnambulism is intimately connected with the subject of sleep and dreaming; and in fact a somnambulator is nothing but a dreamer who is able to act his dreams. In this state of the system persons are perfectly insensible to external phenomena, but all their functions are obedient to an inward consciousness.

Somnambulism occurs in many persons without any manifest predisposing cause, though it is generally connected with a considerable irritability of habit. A morbid state of the stomach has very frequently proved an exciting cause. With respect to the mode of treatment during the fit, it has sometimes been recommended to employ violent means, so as to awaken the somnambulist suddenly, and to repeat this as often as the attacks come on, until they have completely ceased; but such a sudden shock produces serious consequences, and further, as somnambulism is often the result of a salutary crisis of nature, one is never sure of not hurting the patient by suppressing it; and, lastly, the sudden suspension of a habit of the animal economy that has been contracted for a long time, must in all cases be attended with danger. It is better merely to watch over and direct the motions of the patient safely. Somnambulism also generally presents itself as one of the phenomena attending cataplexy. As to the so-called mesmeric sleep see MESMERISM, and also the article HYPNOTISM.

SOMNAUTH or **SOMNATH-PUTTEN**, a town of Guzerat, in Hindustan, with a population of 5000, most of whom are Mohammedans. It is famous for a temple dedicated to the god Siva, which was long a place of Hindu pilgrimage, and celebrated for its vast wealth. The original building was sacked by Mahmud of Ghuznee in 1024, and its gates carried into Afghanistan, where they were afterwards placed before Mahmud's tomb. These gates, which were 16½ feet high and 13½ wide, were made of sandal-wood; and in 1812, when the British captured Ghuznee, they were removed and brought back to India. The ruins of the temple at Somnauth give evidence of its former magnificence and size. It is still a place of pilgrimage for pious Hindus.

SO'NANTS and SURDS. See SURDS.

SONA'TA, a piece of music purely instrumental (and therefore distinct from the *cantata* or vocal piece) and in several contrasted movements. It may be for one instrument or for several, or for a solo instrument and accompaniment. Sonatas for more than one instrument are, however, usually called duets, trios, quartets, quintets, and sextets, according to the number of instruments taking part.

The sonata developed from the *suite*, and while the latter grew more and more definitely into a collection of dance-

tunes of an elaborate kind, the former diverged more and more widely from this type, retaining at last but one movement, the minuet, to mark its origin. And even the minuet often disappears in the sonatas of Beethoven and Mendelssohn in favour of the scherzo. The culmination of the sonata, in the immortal works of Beethoven for the pianoforte and for the violin, gives us usually four movements. The first is in *sonata-form*, the most important and specially musicianly movement of all. The second is in some slow time, Andante at the quickest, but far more often Adagio or Largo, and is specially known as the "slow movement." This is usually an air, sometimes in song-form, and sometimes with variations in a grave style. The third movement, quite short and usually lively, is a minuet or trio, or a scherzo. The fourth movement is generally very brilliant, and is called the *finale*: it is of various forms, but perhaps the most successful is the Rondo-form.

SONATA-FORM, that which governs the first movement of a sonata (solo, duet, trio, &c.) or an orchestral symphony, consists of the following materials. There are two subjects or melodies as carefully contrasted as possible, which form the dual basis of the movement. This begins by a clear utterance of the first subject, preceded or not preceded by an introduction as the case may be; then an episode or a

of leads to the second subject in a related key, probably the dominant. In old-fashioned works a double bar was drawn here, and the whole division was repeated from the beginning. The second division is called sometimes the "coda," and the composer is put upon his wits to devise every means of developing his themes with variety of key, of harmony, and of treatment, mixed with episodes and extended passages, either quite fresh or growing out of variations of the original theme. This usually works up to a climax, generally in the dominant of the original key, and very frequently on a long dominant pedal, passing thus easily into the original key at the first division. Here both the subjects of the movement are repeated, possibly shortened, and certainly skilfully varied in one way, and both are now heard in the key of the movement.

SON CHUS. See SON-THUS-CHUS.

SONG, a term applied to either a short poetical or musical composition, but most frequently to the two in union. As a poetical composition it may, according to Dr. Aiken, be largely defined a short poem, divided into portions of retaining measure, and turning upon some single thought or feeling. As a union of the two arts, Rousseau describes song (*chanson*) to be a very brief lyrical poem, adapted to a suitable melody for the purpose of singing it. As a poetical composition song is used, in this country at least, to denote a poem of any length or character, and is not confined to a single movement.

SONG FORM, as it is often called (or *Liedform* in Germany), is the division, the first and third of which resemble each other, except that the third is usually more compressed than the first in the main body. As for the second or middle division, it is contrasted in position with the other two, in key, in subject, and in treatment. Each of the three divisions of the movement is complete in itself, and more often than not is subdivided into two parts. *Song-form* is therefore akin to Minuet-form.

SONG OF BIRDS.

stood in a general sense to denote all the vocal sounds

made by birds under the influence of love, even when they are as unmusical to our ears as the hooting of the owl or the croaks of the raven. The power of producing clear and sweet musical notes is chiefly found in a large group, the Oscina, of the order Passeres. It is the male bird alone that sings, and his object undoubtedly is to attract and win the favour of the female. The vocal organs usually differ in the two sexes. The singing powers are at their highest during the love-season, though sometimes the song is continued after the eggs are hatched, and in some cases the song lasts throughout the year. Most birds, like the thrush and nightingale, sit while they sing, but the lark and pipit pour forth their song while soaring into the upper air.

SONG OF SOLOMON. See CANTICLES.

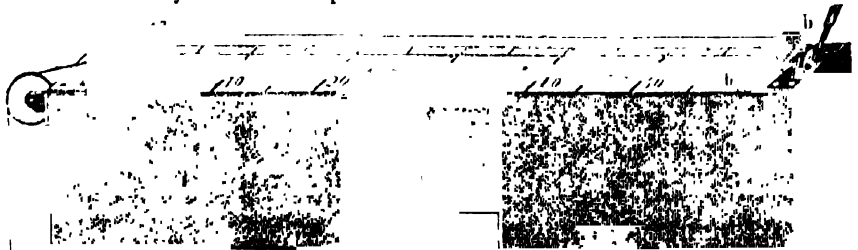
SONNET (Ital. *Sonata*, *Sonetto*), a form of poetry which grew up at the court of the Emperor Frederick II., in Sicily, in the middle of the thirteenth century, and was perfected by Fra Guittone, who died in 1298. The sonnet properly consists of two quatrains and two tercets, or fourteen lines of ten syllables each (or, in weak rhymes, of eleven syllables each). The quatrains ought to be upon two rhymes only; and the tercets also upon two (arranged *ab, ab, ab*), so that there are only four rhymes in the whole sonnet. Or the tercets may be on three rhymes, arranged *abc, abc*, giving five rhymes altogether. The facility of rhyming in the Italian and Spanish languages enables their poets to express every feeling or fancy in the sonnet; but in our sterner English the sonnet becomes more difficult, if the Italian model is strictly adhered to.

The general characteristics of this lyrical piece will be best understood from Wordsworth's celebrated "Sonnet on the Sonnet."

Nuns fret not at their convent's narrow room,
And hermits are contented with their cells,
And students with their pensive citadels,
Maid at the wheel, the weaver at his loom,
Sit blithe and happy; bees that soar for bloom,
High as the highest peak of Furness Fell,
Will murmur by the hour in foxglove bells
In truth, the prison into which we doom
Ourselves, no prison is, and hence to me,
In sundry moods, 'twas pastime to be bound
Within the Sonnet's scanty plot of ground;
Pleased if some souls (for such there need must be)
Who have felt the weight of too much liberty,
Should find short solace there, as I have found

Other authors, however, have constructed the sonnet on different systems. By many, notably by Shakespeare, it is made to consist of twelve alternate rhymes, and the two last lines rhyming together as a distich. In this way there are seven rhymes in the sonnet.

The finest sonnets in the English language are those by Sir Philip Sidney, Shakespeare, Milton, Wordsworth, Blanco White, Keats, Rossetti, and Browning. Mr. Hall Caine's "Sonnets of Three Centuries" (1885), and Mr. Shap's "Sonnets of this Century" (1886), are excellent collections. The latter contains a careful, historical, and comparative account of the sonnet.



Sonometer or Monochord.

SONOMETER, an instrument for measuring lengths of sounding strings in Acoustics; often called the *Mono-*

chor (Gr. *mono*, one; *chor*, string), because it has usually but one string. This string is stretched over bridges *a* and *b*, of which one is movable; or else these are fixed, and a third bridge, movable, is introduced. The surface of the sound-box is graduated, and an *échancrure* is cut out of the side to allow of the use of a bow. A second string, tunable by a tuning-pin, is often introduced for purposes of comparison with the principal string, which is stretched by a heavy weight.

SONTAG, HENRIETTE, COUNTESS ROSSI, an operatic singer of the very first rank, was born at Coblenz, in 1805, of actor parents. She herself appeared on the stage at six years old, and became a consummate actress. She afterwards studied singing, and thoroughly delighted such critics as Weber (who on hearing her sing in 1823 at once called on her to ask her to accept the principal part in his "Euryanthe") and Beethoven, for whom in 1824 she sung in the first production of the Ninth Choral Symphony and the Mass in D. At the close of her career she was equally admired by Berlioz and Mendelssohn. The way in which people's heads were turned by Sontag about 1826 and onwards may be shown by the fact that the festal drinking cups of the students at Heidelberg of those days were made of her satin shoes, while the youths of Göttingen, not to be outdone, destroyed and flung into the river a chaise in which she had ridden, that no one might afterwards use it. After a year or two of this intoxicating success she married Count Rossi, envoy of Sardinia at the Hague, and of course quitted the stage. Her husband's fortune, later on, became seriously impaired; and after nearly twenty years of unbroken domestic felicity Countess Rossi determined to return to the stage. The count was pressed to remain in the service of his king, and consent to a temporary separation from his wife, but this he resolutely refused. In 1849 the countess appeared in London for Lumley (£6000 for six months), and won a triumph almost equal to that she had achieved as a girl. Her voice was, in fact, better than it was before. In Paris and in Germany she was equally successful, and lastly she crossed the sea and charmed the people of America (1852-54). There, in Mexico, in 1854, she had an attack of cholera, which proved fatal.

SOOCHOW, a city of China, in the province of Kiang-su, about 100 miles south-west of Nanking. It is beautifully situated on the Imperial or Grand Canal, and is celebrated both for its splendid buildings and for its picturesque surrounding scenery. Its manufactures of silk are of great importance. An uninterrupted series of towns and villages connects it with Shanghai, which is about 60 miles south-west of Soochow. The population of the city is estimated at about 500,000.

SOOLOO' or SULU ARCHIPELAGO consists of about sixty islands, situated in the Indian Ocean, between the Philippines on the north-east and Borneo on the south. They are composed of two chains, which with Borneo and the Philippines nearly inclose the Sooloo Sea.

The larger islands are of moderate height, but the mountains on Palawan attain a considerable elevation. Some are covered to the very summits with lofty trees, and others with rich pasturage. None of them are volcanic. The group contains some of the most picturesque spots in the world. The wet season occurs from May to September, during the prevalence of the south-west monsoon, and the dry season lasts from October to April. The soil is generally rich, and the crops abundant. The products include rice, sweet potatoes, yams, and many of the finest fruits of the East, but *sago* is the principal food of the natives. Indigo equal to that of Manilla is manufactured to some extent, but entirely for home use. Very good cotton is grown in various parts, but not exported; tobacco is also cultivated. Turmeric and ginger grow to perfection. The woods supply fine timber of various kinds. The islands are well stocked with useful animals. Pearls,

mother-of-pearl, and cowries are among the most valuable products. The names of the largest islands are Basilan, Sooloo, Tawi-Tawi, and Palawan. The island of Sooloo is 36 miles long and 12 broad. The sultanate or kingdom of Sooloo also embraces the northern portion of Borneo and the southern half of Palawan. In 1876 the Spaniards occupied the Sooloo islands with a military force and added them to the colony of the Philippine Islands; a portion of the group, however, seems to remain in the possession of the Sultan of Sooloo.

The Sooloos belong to the Malay race, and are Mohammedans, but they know little of the tenets of their faith. Their number has been estimated at 150,000, including many Chinese. The position of the island of Sooloo is very favourable for commerce, being situated between the Moluccas, Celebes, Borneo, the coasts of Cochin-China, and the Philippines.

SOO'SOO or SU'SU. See PLATANISÆA.

SOOT, the solid carbonaceous substance which is deposited on a cold body introduced into a gas, or candle, or similar flame, and which is a constituent of smoke. It consists mainly of carbon, with a small quantity of hydrogen. Soot from coal-gas also generally contains small quantities of ammonium compounds, formed from the nitrogen in the combustible substance. The presence of these ammonium compounds makes it valuable as a manure, and it is frequently applied as a top dressing for spring corn.

SO'PHI or SOPHY, a term formerly applied to the Shah of Persia; a corruption of *Safi* (mystic), the usual term for ascetics in Persia, and applied in an especial manner to Shah Juyyd u-Dien, who claimed descent from Ali, the son-in-law of Mohammed, and the twelve blessed Imams. Shah Ismail I. (1501), founder of a famous Persian dynasty, was the Sophi's grandson; hence his dynasty is sometimes called that of the Sophis.

SOPHIA (*Triaditza*), the capital and seat of government of Bulgaria, situated on the road from Constantinople to Belgrade, 75 miles north-west of Philippopolis by rail, on a fine plain beside the river Isker. It is a handsome town, with 21,000 inhabitants, crowned with the northern declivities of the Balkans. It has manufactures of silks, woollens, leather, and tobacco; is well supplied with luxurious hot baths, and contains numerous fountains. It is the see of Greek and Roman Catholic bishops, and contains numerous mosques and churches. The fortifications are strong, but opinions differ as to the importance of the town from a military point of view. The town was founded by Justinian on the ruins of the ancient *Sardica*. It had not been entered by a Christian army for more than 400 years when it was captured by the Russians on 4th January, 1878.

SOPHIA, ELECTRESS OF HANOVER, though whom the present royal family inherits the crown of England, was the daughter of the ill-fated Queen of Bohemia, daughter of James I. of England. Sophia was born in 1630, and married Ernest Augustus, duke of Brunswick-Lüneburg, in 1658. The duke was made an elector of the German Empire in 1692, as Elector of Hanover. He died in 1698, and was succeeded as elector by his son George (born in 1660), who afterwards became George I. of England. Hanover remained an electorate until 1814, when the Congress of Vienna raised it to the rank of a kingdom. Sophia, then electress-dowager, was preferred in the Act of Settlement (12 & 13 Will. III., 1701) as Electress of England, before several nearer claimants, such as the Prince of Wales, son of the deposed James II., the Duchess of Savoy, daughter of Henrietta, duchess of Orleans (who was a daughter of Charles I. of England), and one or two others, because all of them were Catholics, and the electress was a Protestant. The cause of the passing of the Act of Settlement was the death of the Princess Anne's last child, and the

certainly that she would not now give the kingdom an heir. The Act was confirmed in 1702, and the electress was naturalized as a British subject in 1705; but Anne hated the house of Hanover, and when queen would never allow the Elector George to take his seat as an English peer. The crown was again limited to Sophia by the Act of Union (6 Anne, 1706). The Electress Sophia died in May, 1714, three months only before the crown of England came to her family.

SOPHIA, SANCTA, the principal sanctuary of Mohammedanism, is one of the chief ornaments of **CONSTANTINOPLE**. It was originally a Christian church, founded by the Emperor Constantine II., and dedicated not to any saint, but to the "Holy Wisdom" (*Hagia Sophia* in Greek). It was twice destroyed by fire—once after the exile of John Chrysostom, and again in 532 during an affray caused by the fierce passions of two religious sects. The Emperor Justinian then resolved to erect a building of far greater magnificence, from the designs of the architect Anthemios. Ten thousand workmen were employed, who, to stimulate their labours, were paid daily. The emperor himself never failed to visit the works at least once a day, and encouraged them to redoubled exertions by his rewards and approval.

In eleven months and ten days from the first foundation the cathedral was completed and consecrated. The emperor, looking upon its magnificence, exclaimed, with curiously blended feelings of self-praise and devotion, "Glory be to God, who hath thought me worthy to accomplish so great a work. I have surpassed even thee, O Solomon!" But before twenty years had elapsed an earthquake overthrew the eastern part of the dome. Its restoration was immediately undertaken, and in the thirty-sixth year of his reign, Justinian celebrated the second dedication of a temple which remains, after the chance and change of twelve centuries, a splendid monument to his enthusiastic piety.

Externally, the principal feature is the dome, which has four-and-twenty windows, and is formed with so small a curve that the depth is equal only to one-sixth of its diameter. The measure of that diameter is 115 feet. The centre is 180 feet high. The circle encompassing the dome rests on four stout arches, while their weight is in turn supported by four massive piers, flanked by columns of Egyptian granite. Two of the arches just named open into tiers of galleries, but the two in the direction of east and west, that is, of the length of the church, are closed ape-fashion by large half-domes, which give the nave an oval form. These half-domes have the same diameter as the great dome itself, and each is cut into by three smaller half-domes. The whole effect is of incredible lightness, and it is scarcely an exaggeration of the old writers when they declared that the dome seemed to float in the air.

The ground-plan of the edifice is a Greek cross; breadth, 243 feet; length, 269 feet, but as the north and south arms are filled with tiers of galleries the shape of the nave appears to be the shape of the church, i.e. an oval. Each of the four corners is ornamented by a minaret, erected by Solim II. in 1566.

The piers sustaining the dome are composed of huge blocks of freestone, hewn into squares and triangles, bound together by iron rings, and fastened with a cement of lead and quicklime. The frame of the edifice is constructed of brick, faced with slabs of marble; and the rich interior, the dome, the two larger and six smaller cupolas, the gleaming walls, the hundred columns, and the pavement of waved marble intended to imitate the rolling of the sea, form a splendid picture, though somewhat defaced by the ignorant barbarism of the Turks.

The Christian cathedral was not inappropriately decorated with the last spoils of paganism: with eight porphyry columns from the Temple of the Sun at Rome, and six of jasper or green marble from the Temple of Diana at

Ephesus, &c. The domes were inlaid with mosaics of the Saviour, the Virgin, saints, angels, and prophets, which the bigotry of Mohammedanism has unfortunately mutilated. The total cost of the superb pile was computed at a sum equal to £1,000,000 sterling, according to the present value of money.

Sancta Sophia was severely injured by an earthquake in 1346, when the images, the altars, and the sanctuary were crushed by the fall of the eastern half-dome. Little time was lost, however, in repairing the mischief wrought. Funds poured in from Greek princes and nobles; the rubbish was cleared away by the incessant labour of men of all ranks and ages; and the poor remains of riches and industry in the falling empire were consecrated by the Greeks to the most stately and venerable Christian temple in the East.

Constantinople was captured by the Turks in 1453, and the crescent of Mohammed supplanted the cross of Christ in its churches. Many were destroyed, but the great cathedral was visited by the victorious sultan himself, Mahmoud II., and stringent orders were issued to prevent its spoliation. It was afterwards converted by his order into an imperial mosque. Those objects of worship or admiration which the Moslem regarded as superstitious, and as violating the injunctions of the Koran against any representations of the deity, were removed or broken up; all the crosses were trampled under foot; and the walls which had glittered with mosaics and images were washed and purified into a condition of innocent simplicity. On the ensuing Friday the *namaz* of prayer and thanksgiving, in accordance with the laws of Mohammed, was celebrated by Mahmoud on the high altar.

SOPHISM (Gr. *sophisma*). A sophism is the use of some word in a different sense in the premises from that in the conclusion, and this is the definition of Aristotle: "When the discourse is a demonstration of anything, if it contains anything which has no relation to the conclusion, there will be no syllogism; and if there appears to be one, it will be a sophism, and not a demonstration."

This confusion of words and ideas is the origin of all errors and sophisms; but though errors and sophisms are logically constituted alike, yet the instinctive sense of mankind marks the difference between an incomplete view (error) and wilful perversion (sophism). In all cases a sophism is supposed to be recognized as such by the sophist. It is an endeavour on his part to "make the worse appear the better reason." It is the consciousness, then, of the sophist which distinguishes and renders odious his error as a sophism.

SOPHIST, in the original sense of the word, one eminent for intellect or talent, being derived from Gr. *sophos*, wise or learned, and in its earliest use comprehending even poets and artists. Protagoras was the first who adopted the name of *Sophistês*, to distinguish more decidedly one who makes others wise, especially one who taught eloquence, the art of governing, politics, or, in short, any kind of practical knowledge. But the word sophist degenerated after that time until it acquired the odious meaning which it retains at the present day. Afterwards, in the time of the Roman emperors, the name again became an honourable appellation, and was applied to the rhetoricians.

The Sophists, of whom Sokratês was the great opponent, were a class of men who went about Greeco discoursing and debating, lecturing and educating the sons of rich and noble families, and receiving money for their exertions. It was chiefly this latter point which excited the bitterness of Sokrates and Plato against them. The cause of their success lay in the nature and habits of the Greek people, who were much addicted to talk and little to study—who were passionately fond of, and easily led by, rhetoric. The period at which the Sophists flourished was one of obsolete creeds. Religion was attacked by open scepticism. Everything

human and divine had lost its earnest nature, and came to be regarded as an art—an exercise of ingenuity. The art of the Sophists was oratory. Assuming that there was no right or wrong in the nature of things, but that the sole measure of right and wrong was the existing morality or the existing law, it was their boast that they could make the worse appear the better cause. Their doctrines closely resemble those of the Sceptics, since they equally denied the possibility of truth, and even interdicted inquiry into it; but the distinction between these sects consists in the Sophists not making their arrogance under doubt, but boldly and distinctly averring that there was no truth at all, and seeking to communicate this wisdom to others, to save them the trouble of investigation.

The Sophists probably contributed to the improvement of the Greek language by the labour which they bestowed upon the distinction of terms, and by their attempts to reduce persuasion to the form of an art. Though many or most of them may have had no settled moral principles, and no very exact philosophical conceptions, it is somewhat difficult to imagine that any considerable number of teachers could exist whose precepts were intended to be subservient to fallacy and deception. It is much more likely that many of them merely formed a very extravagant idea of their own acquirements and of the rhetorical art which they professed, and that they found persons ready to listen to their pretensions.

SOPHOKLES was born in the village of Kolonos, a mile from Athens, in B.C. 495, fifteen years before the battle of Salamis, when Aischulos was thirty years old. At the age of fifteen, when the Greeks had defeated the Persians in the battle of Salamis (480 B.C.), Sophoklēs, on account of his beauty, was selected by those who had the management of the solemnities which followed the victory, to act as leader of the chorus which danced around the trophies in Salamis and sang the hymn of victory. He produced his first tragedy in the year B.C. 468. Aischulos was at this time the great dramatist of Athens, but his young rival gained the victory.

Sophoklēs was actively employed in the exercise of his art from B.C. 468 to B.C. 410, when he brought out the "Antigonē," his thirty-second drama, and gained the prize. The Athenians appointed him one of the commanders in the war against the mistocrats of Samos, who, after being expelled from the island by the Athenians, had returned from Anaea in Caria, and endeavoured to induce the Samians to break out in rebellion. In this campaign Sophoklēs was the colleague of Periklēs, and he is said to have become acquainted with Herodotos in Samos. Whether, after this expedition, which ended in 439 B.C., he took any further part in public affairs, is not certain. His life seems to have passed in the glorious career of a successful dramatist. In his old age Sophoklēs was summoned before the judges on a charge of imbecility by his son, who feared lest the poet were about to favour a grandson whom he greatly loved, in the disposition of the property, at the expense of himself. For an answer Sophoklēs recited the chorus, "Thou comest here to the land, O friend," in his then unfinished play, "Oidipous at Kolonos," and the judges at once stopped the trial. To accuse the author of such verses of want of mental capacity was altogether too absurd for credence. The great poet died in B.C. 406.

Aristophanes of Byzantium attributed to him 113 genuine dramas, which number includes his satiric pieces. At the age of forty-five he had written thirty-two dramas, so that more than two-thirds of his works were composed during the latter half of his life. The "Oidipous in Kolonos" (Œdipus in Colonus), his last production, was written a short time before his death, but was not brought out till the year B.C. 401. Of all his plays there only remain seven complete; of others we only possess some fragments, and sometimes no more than the titles.

The ancients considered Sophoklēs as the most perfect of all dramatic poets, and their admiration was well founded. He abandoned the pomp, grandiloquence, and harshness of Aischulos, for which he substituted a noble simplicity and exquisite tenderness. All his characters are men in the true sense of the word, beings with whom we can sympathize. Each drama turns upon one great action, the "Antigonē" perhaps excepted; and one idea is perfectly developed in each play. Although Sophoklēs may usually have brought out three tragedies at once, according to the custom of the time, each of them was complete in itself. The lyric part, or "choros," in Sophoklēs has no longer that conspicuous place which it has in Aischulos; it no longer expresses the feelings supposed to be called forth in the audience; but the tragic development of the characters, or, in other words, the action, is the prominent part of the drama. As the action was thus extended, he introduced a third actor, or the *tritagonistēs*, so that now three actors might appear upon the stage at once, whereas before his time there had not been more than two at a time, which rendered the action, as well as the dialogue, monotonous.

The works of Sophoklēs were first printed by Aldus, (Venice, 1502, 8vo). The best of the subsequent editions are those of H. Stephens (Paris, 1568, 4to), and that of Brunck (Strassburg, 1756). One of the most useful editions for students is that by E. Wunder (Gotha and Erfurt, 1831–41). A new recension, from the original MSS. of the great Laurentian (Medici) Library, is that of Pappageorg (second edition, Leipzig, 1887). The editions of single plays and dissertations upon them are very numerous. There are English translations by Franklin, Potter, T. Dale, and Professor Plumptre. The finest English translation by far, clear, racy, idiomatic, and of a felicity of rendering amounting almost to genius, is, however, that by Professor Jebb, of which the "Oidipous the King" appeared in 1884, and the "Oidipous at Kolonos," in 1886 (Univ. Press, Cambridge).

SOPHORA is a genus of plants of the natural order LEGUMINOSÆ. The species are ornamental shrubs and trees, found in the tropical and temperate parts of the Old World. The species best known in England is *Sophora japonica*, which, as a native of the northern latitudes of the country from which it is named, is hardy enough to withstand the climate of England. It is a large round-headed tree, about 10 feet high, with smooth dark green young branches, graceful deep bluish-green pinnate leaves, and large loose panicles of small whitish or cream-coloured flowers, produced in the autumn. The flowers are used in China, where the tree is cultivated, for dyeing, especially for producing the fine yellow colour of the robes of the mandarins. The wood is hard, fine-grained, and used in turnery.

SOPORIFICS. See ANODYNES; NARCOTICS.

SOPRANO (Italian), the highest species of female voice, extending in range from C below the stave to A above it, or even higher, as in the cases of Madame Lind-Goldschmidt, Grisi, Bozio, Sontag, and Titicus, who could reach C and even E above the stave. The highest notes, however, are generally considered falsetto. Such voices are characterized by brilliancy, freshness, and vivacity, and yet are capable of expressing the tenderest emotions. *Mezzo soprano* ranges between soprano and contralto, or from A below the stave to F on the fifth line. See also SINGING.

SORAC'TE, a famous mountain near Rome, visible from the city, often snow-capped. It was sacred to Apollo, whose temple stood there.

"Vides ut alta nive stet candidum Socrate."

Horace, "Carm." 1. 9.

SOR'BIC ACID, an acid prepared from *parasorbic* acid by heating it with caustic potash. *Parasorbic* acid is a volatile oily acid obtained by distillation from the berries

of the mountain ash (*Pyrus aucuparia*, natural order Pomaceæ). It is a colourless liquid, having the specific gravity 1.068, and the formula $C_6H_8O_6$. It boils at 221° C. (430° Fahr.), and is soluble in water, alcohol, and ether. Sorbic acid ($C_6H_6O_4$) is isomeric; it crystallizes in colourless needles, and is soluble in hot water, alcohol, and ether. It forms crystalline soluble salts called sorbates, having the general formula $C_6H_7MO_4$.

Sorbic ether, or ethyle sorbate, $C_6H_7(C_2O_3)_2$, is an aromatic liquid boiling at 195.5° C. (384° Fahr.)

SOR'BITE or **SOR BIN** ($C_6H_{12}O_6$) is an unfermentable sugar found in the juice of mountain-ash berries. It crystallizes in octahedrons, and is very soluble in water, but insoluble in alcohol. It is very sweet, and although not acted on by yeast, with ease it is susceptible of the lactic acid fermentation.

SORBONNE, a celebrated college at Paris. The founder was Robert de Sorbonne, an ecclesiastic born (in 1201) at the village of Sorbon, in the territory of Rethel (Ardennes), of poor parents. His talents and acquirements introduced him to the notice of Louis IX. (St. Louis), king of France, who retained him at his court as his confessor and chaplain, and showed him great favour. In 1251 he was made a canon of Cambrai, and, mindful of the difficulties which he had experienced in early life, he formed the plan of contributing to the assistance of poor students. His intention was to establish a society of secular priests, for whom a maintenance in common should be provided, and who should devote themselves gratuitously to the work of instruction in the lower. Robert de Sorbonne was the first head of the establishment, and it was not until after eighteen years' of arduous experience that he settled the constitution of the society, which were not in any respect changed until the suppression of the college at the Revolution. He died in 1274, bequeathing all his property to the college which he had founded. Rector a resident and improved the Sorbonne. The Sorbonne was one of the four constituent parts of the faculty of theology in the University of Paris, and its high reputation caused it to be often appealed to for the judgment of its members on questions of theology and morals. In 1808 Napoleon entrusted it with the entire faculty of theology when reconstructing the university. The Sorbonne now serves as public lecture rooms and examination rooms for purposes of the University of Paris, of which it in some sort forms the centre. It was here the last printing presses of Paris were established.

SOR BUS. See SERVICE TREE.

SORDI NO, SORDINI, in music. See MUTE (third article). The dampers of a pianoforte are called *sordini* in Italian; but the phrase *con sordini* means with the soft pedal (and not with the dampers, in our modern sense of that word); and it is contradicted by *senza sordini*, i.e. without the soft pedal. These terms arise from the fact that there was about a hundred years ago a *sordino*-pedal, an attempt to mute the tone, somewhat as the celestapedal does to-day. [See PEDALS.] The correct phrase for the old softening soft-pedal, now falling into disuse, is not *con sordini*, but *una corda* (one string), and is contradicted by *tre corda* (three strings).

SOR EL, AGNES, the mistress of Charles VII. of France, to whom the excellent change of character of the king's middle period is often attributed, and who (if that is true) was a benefactress to France worthy of following in the track of Joan of Arc, who had just gained the kingdom for a then rather worthless king. She was born in Touraine, 1409, and was maid of honour to Isabella, duchess of Anjou, in 1421, accompanying her to the court of France in 1431, when she joined the queen's ladies and captivated the king. Her charms of mind were equal to her great beauty. She retired from court in 1445, though the king induced her to return in 1449; she died the next year at Jumièges.

SOR'GHUM is a genus of GRASSES belonging to the tribe Andropogoneæ, which is extensively cultivated for food, presents several varieties. One of these, *Sorghum vulgare* (Indian millet or durra), the Guinea corn of the West Indies, takes the place of barley and oats as a cereal in India, Arabia, Asia Minor, and Southern Europe. The abundant round hard seeds yield a very white flour which makes good bread, and they are also employed for feeding domestic animals. Another variety is the Sorgho or Chinese Sugar-cane (*Sorghum vulgare*, var. *saccharatum*), which has been cultivated from very early times in China, and also in Africa, where it is called *Imphac*. It has been introduced into the United States, where it is cultivated chiefly for the syrup or molasses, as the yield of cane sugar is too small to make its extraction profitable. Much attention has been given to it in France, where it has been employed in the manufacture of sugar and the distillation of alcohol, instead of beet-root. It has been found to contain from 16 to 20 per cent. of sugar, while beet yields only from 8 to 10 per cent. The climate of England has been found too cold and damp for both these varieties.

SORITES, in logic, a cumulative syllogism. An example is the best explanation. Themistokles declared in jest that his baby governed the world, as thus:—"My baby rules my wife, my wife rules me, I rule Athens, Athens rules Hellas, Hellas rules Europe, Europe rules the world."

SORO'SIS, in botany, is a term applied to fruits, consisting of a fleshy mass resulting from the consolidation of many flowers, seed vessels, and their receptacles, as in the bread-fruit and pine apple.

SOR'REL is the popular name of several plants found in Britain. The Common Sorrel (*Rumex acetosa*) is a diaceous perennial herb belonging to the order POLY-GONACEÆ and genus RUMEX. It is common in meadows and pastures in Britain and throughout Europe. It grows to a height of 1 or 2 feet, and has a tufted slender root-stock, simple stem and arrow-shaped leaves, the upper ones sessile, and small greenish flowers, often turning red, with a six-leaved perianth. The leaves are agreeably acid owing to the presence of binoxalate of potash. This species and the French Sorrel (*Rumex scutellatus*), a native of France and Italy, are used as salads and pot-herbs, though not to any great extent in this country. In France the sorrel is extensively cultivated. The Sheep's Sorrel (*Rumex acetosella*) is a much smaller plant, with stems varying in height from 3 inches to over a foot, and a creeping much-branched root-stock. It is found in dry pastures, and flowers from May to August, the fertile flowers turning bright red in autumn.

The Mountain Sorrel (*Oxyria digyna*) is the only species of a nearly allied genus, distinguished from *Rumex* by its four-leaved perianth, two stigmas, and compressed broadly winged fruit. The mountain sorrel is an Alpine species found in Britain on the highest mountains of North Wales, the north of England, Scotland, and south-west of Ireland. It is a perennial, growing to a height of from 6 to 18 inches, with a tufted root-stock, heart-shaped or kidney shaped leaves, and small flowers in panicles. Like the other sorrels it is an antiscorbutic, and makes an excellent pot-herb.

The wood-sorrels are species of OXALIS, a genus of the order GERANIACEÆ. The Common Wood-sorrel (*Oxalis acetosella*) is remarkable for producing two kinds of flowers. The ordinary flowers are white, veined with purple, solitary on a slender flower-stalk or scape. In addition there are formed in autumn close to the ground much smaller *cleistogamous* flowers, that is, flowers which never open, and are necessarily self-fertilized. This is thought to be a provision for a failure of the ordinary flowers to produce sufficient seed; a similar phenomenon occurs in some of the violets (*Viola*). Another species of wood-sorrel, *Oxalis corniculata*, with an annual or biennial stem, occurs locally in waste shady places in the south-west of England.

SORREL, SALT OF. See OXALIC ACID.

SORRENTO (Lat. *Sorrentum*), is a thriving maritime town of Italy, in the province of Naples, being picturesquely situated on the rocky promontory which separates the Bay of Naples from the Gulf of Salerno. The inhabitants are chiefly occupied in the manufacture of silk, fancy wood-work, and the cultivation of the vine. The town has a handsome cathedral. There are numerous ruins in the vicinity, chiefly of Roman origin, and remains of the mediæval walls erected for the defence of the town, which, towards the sea, is protected by precipitous rocks. The climate is dry, genial, and salubrious; and Sorrento is therefore a favourite resort with invalids. To the north-west extends a noble table-land, about 1000 feet above the sea-level, intersected with valleys and ravines, brightened by streamlets, studded with villas and vineyards, and encircled by a range of sheltering hills: this is the well-known *Piano di Sorrento*. Tasso, the poet, was born at Sorrento in 1511. The population in 1881 was 7869.

SORTES VIRGILIANÆ (Lat. *sortes*, a lot), an ancient mode of divination consisting of choosing passages from certain books, as from Virgil, for instance, by lot. Herodotus, who speaks of a similar thing with regard to Homer's poems, gives an instance of the frands to which it offered opportunities. Onomakritos, a celebrated sorcerer, he says, who had made use of the oracles of Mousaios to serve his own ends, was driven from Athens by Hippochos, the son of Perisistratos, because he had been surprised in the act of inserting in the oracle a forged verse which predicted that the neighbouring isle of Lemnos should disappear from the sea. Homer, and at a later period Virgil, were frequently consulted by lot. It is said that certain passages from the writings of the latter poet announced to the Emperors Hadrian, Alexander Severus, and Claudius II., their ultimate destinies. Charles I. of England and Lord Falkland drew remarkable prophecies from Virgil in a jestival of *Sortes Virgilianæ*. Charles, at Oxford, opened the Virgil at random, and touched a line with his finger. It was line 881 of Book IV. of the *Æneid*; which will be seen, on reference, clearly to prophesy dire evil, even to the loss of life. Falkland tried to laugh it off by a trial for himself. His finger fell by chance on line 230 of Book XI., the lament of Evander over his son Pallas, fallen in battle. Very soon afterwards Charles's fortunes began to wane, and the gentle Falkland fell at Newbury (1642). But in the middle ages the *Sortes Virgilianæ* gave place to a mode of divination called *Sortes Sanctorum* or *Sortes Biblicæ*. In the seventeenth century the divination by the Bible was still in use, and in the eighteenth century was practised commonly among the humbler members of the Methodist Society. It was never recognized, however, by the leaders, and the custom has now died out.

SOSIGENES, an Egyptian astronomer who was brought to Rome by Julius Cæsar, and superintended the correction of the calendar.

SOSTENU'TO (Ital.), in music, a term used to signify that the tone is to be steadily maintained, or a particular note held for a considerable time.

SO'THIAC PERIOD. The ancient Egyptian year consisted only of 365 days, without any intercalation, and was divided into twelve months of thirty days each, with days added at the end. The Scholiast on Aratus informs us that the priests were sworn never to alter this year. Again, Diodorus Siculus says that the Egyptians add five days and a quarter to the 360 days of their twelve months, a statement generally supposed to refer to a more correct year which had been introduced among the people, while their religious festivals continued to be regulated by the old year. The propriety of this mode of reconciling the two authorities is made probable by the known existence of the Sothiac period (also called the Canicular year, *Annus Magnus*, &c., derived from Sothis, a name for

the star Sirius), mentioned by Geminus, and also by Censorinus and Clement of Alexandria, from older writers. It is obvious that 1161 years of 365 days each make 1460 years of 365½ days. This period of 1460 Julian years was the Sothiac period.

SOT'IE, a curious form of the mediæval drama of France at the first half of the sixteenth century. About a dozen examples remain, the finest being by Gringoire (1478-1544). The sotie is a political comedy, the characters being stock personages, as in the early Italian comedy. Thus Gringoire gives us the *Prince des Sots* and his mother, *La Mere Sotte*, as the chief characters, typifying the temporal and spiritual powers respectively; and the rest of the characters are *Sotte Commune* (the mob), *Sotte Occasion* (chance), and so forth. The allusions to contemporary politics, once the cream of the whole jest, are not now intelligible, and by consequence the sotie is a very dull affair except to antiquarians. At the time, however, it afforded a poet the same licence that the buffoon or court-jester possessed, and many a homely truth might be conveyed in the shafts of its satire. The whole thing was a "folly" (*sotie*), and as such passed unheeded.

SOU, the French halfpenny. The term is derived from the *Soribus* (which see), but though the latter was worth a twentieth of a pound of silver at its introduction in Charles the Great's time, the *liore* or pound was reduced, and the *son* with it, until in the last days of the monarchy it was worth only about a halfpenny sterling. It was suppressed by the new fiscal arrangements of the Revolution, and the livre gave way to the closely approximate *franc*; but as the new five centime piece, the twentieth part of the franc, was almost identical with the old *son*, the people called it by that name, which it has ever since retained. With the common people a piece of five *francs* is still *une pièce de cent sous*, and writers yet (perhaps intentionally) confuse the traveller by reckoning up their petty accounts entirely in *sous*.

The *son* and *liore* of the Isle of Mauritius are worth just half those of France.

SOU'ARI NUT. See CARYOVAL.

SOUDAN' or **SUDAN'** is that section of Africa lying immediately south of the Sahara. Its limits are variously defined. It may be said to be bounded by the Sahara on the N., to be merged into Senegambia and the countries of the Guinea Coast on the W., and to extend to the Abyssinian highlands on the E. The southern limit is north of the Congo region. This vast territory is divided into numerous states. It is the home of the true negro race, its name signifying the country of the blacks, as apart from the other races of Africa; but Arabs have here imposed their religion and civilization upon the natives, and have given rulers to many of the negro states. The administrative province of the Soudan, from which Egypt has now withdrawn, was only constituted in 1877. It embraced the entire basin of the Nile from the equator to the Mediterranean, with an area of territory 1640 miles in length, and an average breadth of not less than 660 miles; it was computed to exceed in size any four of the great kingdoms of Europe taken together, with the exception of Russia. It included Darfur, Kordofan, and the provinces of the equator, and was surrounded on the east, north, and west by a belt of desert, which at the narrowest point is nearly 200 miles across, and the approach to it by the Nile was rendered insecure on account of the deposits which frequently block the passage of that stream. The deserts, which commence at Cairo, form an unbroken line extending to the river Atbara (upon the 17th degree of north latitude), the first affluent that adds its waters to the Nile, which flows through 1200 miles of sands unannounced by a tributary. These deserts would be impassable in the absence of the camel, but although they appear devoid of sustenance there are numerous dells and narrow valleys which show

traces of water action. In such localities a scanty herbage is exhibited, of so rough a nature that no animals except the camel, wild ass, and the gazelle would swallow the wiry material, but this coarse pasturage is sufficient for the camel's wants, and enables it to traverse these inhospitable regions.

The rainy zone of the Soudan is not limited by an exact parallel of latitude, as it extends further north in proportion to the continuation of the lofty mountain range which walls in Abyssinia when approaching the Red Sea. The fertility of the country depends entirely upon the rainfall; this commences in May and continues until the middle of September. None of the rivers overflow their banks, as the beds are far below the general level of the country; these have been scooped out of the deep alluvial loam in the course of ages, and the rich soil thus dissolved has been carried by the stream to deposit its fertilizing principle in the delta of Lower Egypt.

The margin of the fertile soil commences near Gozerajup, upon the Atbara River, and continues thence to Kassala. Throughout the course of the Atbara and Settite (or Taccazy) rivers the soil is excellent, and the level surface of rich loam which forms the great flat of Meroe is cut by the Atbara to a depth of more than 150 feet, the uniform surface of the plains being scored to the extent of 2 miles in maximum width, which forms a valley, through which the river flows until it reaches the desert sands to the north of Gozerajup. For the last 100 miles up to that point the valley of the Atbara is gradually diminished, until it forms a simple streak of water slightly below the surrounding level of yellow sand; through this sterile area it hurries in a rapid stream, marked in its desert course by the green line of dome palms and mimos which fringes the banks, nourished by the only moisture in that land of thirst.

The rivers Angrab and Salaam, which flow into the Atbara River south of the Settite, although much inferior, exhibit the same character, having scooped out valleys from the rich soil of the level plains; the cubic contents of all these deep depressions have been transferred by the mud-charged waters to the delta of Lower Egypt.

As Egypt has derived its fertility from the soil thus delivered from the higher levels of Abyssinia and the Soudan, it can be well imagined that a vast field of agricultural wealth must remain unknown within those distant regions through which the rivers flow. The Blue Nile is also surcharged with mud, but not to the same extent as the Atbara River, which is the actual parent of Lower Egypt.

A territory including such a variety of soils will comprehend a corresponding variety of productions. The deserts supply camels, sheep, and goats. The mountains between Suakin and Berber, at an elevation of about 2500 feet above the sea level, are in many places clothed with senna. The thorny mimos between the Atbara and the Settite rivers and the jungles of Kordofan produce a supply of the finest gum-arabic. The neighbourhood of the Atbara River, from Kassala and throughout its southern course, together with the districts through Kadarif to the Blue Nile, are celebrated for the growth of durra (the native corn) in quantities so enormous that a camel load of 500 lbs. may be purchased for 3s. 6d. Sesame for the manufacture of oil, dochan, a species of millet, and cotton complete the list of cultivated produce, but ivory and india-rubber are brought to the Soudan from Central Africa.

There is no country in the world so favourable to the cultivation of cotton as that portion of the Soudan within the rainy zone, where showers from May to the middle of September insure the growth of the cotton plant, and a crop-time absolutely free from moisture assists the planter to collect his harvest in the best condition. Wheat is cultivated south of Khartoum, and could be produced to any extent were there an outlet to the Red Sea by railway.

The population of the Soudan is divided into numerous tribes. The Nubian Desert, south of Assouan, is the home of the Bishareens. These are pure Arabs. Between Suakin and the Nile the Haddendowas occupy the mountains and the tract of country as far as Kokreb. This tribe speaks a peculiar language (not Arabic), and in this respect it differs from all others. The Hallongas are south of the Haddendowas, in the neighbourhood of the river Mareb or Gash. The Hamrans, Shookereahs, Dabainas, Roofars, Hamadas, and Kunanas inhabit the country between Abyssinia, the Blue Nile, and the main river to its junction with the Atbara, including the tract from 33° to 37° E. lon., and 13° to 17° N. lat. The Jahleens occupy the Nile borders south of the confluence with the Atbara.

The inhabitants of Sennaar are a peculiar race, but the peninsula between the Blue and the White Niles includes several minor tribes, all of whom are governed by their sheikhs. The warlike element in the population is still to be found in the districts of Soudan and in Darfur. The inhabitants of Bahr Gazelle and of the region to Gondokoro have always proved tractable enough subjects, but the black peoples of the Soudan have retained much of their valour and natural love of independence. Those which inhabit the borders of the Blue Nile and the main river are cultivators of the soil, and dwell in permanent villages. The Arabs of the deserts are pastoral and nomadic, for the simple reason that a change of site is necessary when seeking pasture for their flocks. The sparse herbage of the wilderness affords but scanty nourishment; thus an immense extent of country is required for the grazing of large herds of camels, cattle, goats, and sheep, which constitute the wealth of nomad people. It must be borne in mind that Arabs are nomadic from necessity only, and, should they be supplied with good land and means of irrigation, they would gladly settle. They are, however, at present thoroughly conservative in their principles. The wells which watered the flocks of their ancestors 5000 years ago are the same sources from which they drink at the present day. The rope marks in the hard basalt slabs around their margins testify to the antiquity of these desert springs. The Soudan is a great field for the slave-trade, which, except when General Gordon was governor of the province, flourished under the rule of Egypt, and the accounts given of the sufferings of the slaves as they are driven across the terrible deserts are heartrending.

The first conquests by Egypt in the Soudan were made by Mehemet Ali, who subdued Kordofan in 1821, and its authority continually extended until the uprising under the Dongulawi, Mohammed Ahmed, who began his career as a Mussulman enthusiast, and arrogated to himself the title of "Mahdi," or the long-expected Redeemer of Islam.

In the summer of 1881 the movements and proclamations of this individual attracted the attention of the governor of the Soudan, and an official was sent to make inquiries as to what were his plans and intentions. At that time he resided in a small island of the White Nile, and he had already attached to his person a guard of chosen followers, who stood before him with drawn swords. He refused, not unnaturally, the demand of the Egyptian official to accompany him to Khartoum; and when a small force was sent by water to effect his capture it was ignominiously repulsed and compelled to return empty-handed. Mohammed Ahmed then left his island home for a place of greater safety, and settled down at Gebel Gedir, where he was left for several months, not merely undisturbed, but at liberty to increase his influence among the neighbouring tribes, and, perhaps, to form a joint plan of action with the dealers in slaves. His fame was further enhanced by the defeat, in December, 1881, of a force which attempted to expel him from Gebel Gedir. In the early months of 1882

another and stronger expedition was fitted out, but it was met and completely defeated. At this point, after a course of unchecked success, the Mahdi met with his first reverse. He then attacked El Obeid, and was repulsed with the loss of 6000 of his warriors in one assault alone. Elsewhere his followers failed to capture the towns where the least fortifications had been erected; and it seemed as if the fanaticism of the Mahdi's followers would be able to effect very little against stone walls or earthworks. Later on, however, El Obeid fell into his hands, and great preparations were made by the Egyptian government to crush him. An army of 10,000 men, under Hicks Pasha, was collected, but the expedition ended in its complete destruction and the victory of the Mahdi, whose power now became formidable. The despatch of General Gordon to KHARTOUM followed. When he became besieged there an English army was sent to rescue him, but in spite of the greatest efforts and an enormous expense it arrived too late. The English army was withdrawn to Lower Egypt, and the Soudan was left in possession of its original inhabitants.

SOULAMEA is a genus of plants of the order SIMARUBACEÆ, indigenous to the Moluccas and the Fiji Islands. It consists of one species only, *Soulamea amara*, a tree with simple alternate stalked obovate leaves and small green flowers in short axillary spikes. Like the Quassia, and most other plants of the same family, it is remarkable for its bitterness in every part. The root and bark, when bruised and macerated in water, are employed in India, Java, and the islands of the Eastern seas as a remedy for pleurisy, asthma, epilepsy, cholera, &c. They act both as emetics and tonics.

SOULT, NICOLAS JEAN DE DIEU, Duke of Dalmatia and Marshal of France, one of the ablest of the French generals bred in the school of Napoleon, was the son of an obscure notary, and was born at St. Amans la Bastide, in the department of Tarn, 29th March, 1769. In 1785 he enrolled himself in an infantry regiment, and displayed so much assiduity, military talent, and general intelligence that in a few years he attained the rank of adjutant-major. After serving under Hoche, Jourdan, and Lefebvre, and especially distinguishing himself at Fleurus, he was promoted to a brigadier-generalship. He first attracted public attention, however, by his services in 1799, under Massena, and against the Russians and Austrians, when he was recommended to Napoleon for one of the four consulships of the consular guard. At Genoa he was wounded and taken prisoner, but recovered his liberty after the victory of Marengo in 1800, and, as a warm Napoleonist, was appointed to an important command in Italy. In 1804 he received a marshal's baton, and was intrusted with the organization of the army for the invasion of England assembled at Boulogne. In 1805 he accompanied the emperor on his Austrian campaign; and at Austerlitz (2nd December) commanded the right wing, whose brilliant charges did much to insure the success of that memorable day. He also served with great distinction at Jena in 1806, and at Eylau in 1807, nor can it be denied that he well merited the dukedom of Dalmatia with which Napoleon rewarded him. Affairs in Spain presenting a gloomy aspect, he was despatched to retrieve the credit of the French arms. He opened a path to Madrid for the pseudo-king of Spain, Napoleon's brother Joseph, and by a series of well-designed combinations, at the head of greatly superior forces, compelled Sir John Moore and his small British army to retreat upon Corunna. Here the British made a stand (16th January, 1809), and the battle that ensued, if not a victory on their part, was at least so stubbornly fought as to check the French advance and secure the unmolested embarkation of the retreating troops. Soult continued in command in Spain for the next three years, always displaying imperturbable *sang froid* and the elasticity of resources characteristic of a great general. At

Albuera, however, he suffered a severe defeat, and at Oporto was surprised by Wellington. He was summoned early in 1813 to Germany, where Napoleon needed the help of his ablest generals to sustain his sinking fortunes. He was present both at Lützen and Bautzen, but on news arriving of the terrible defeat of King Joseph and Marshal Jourdan at Vittoria (21st June, 1813), he was hastily despatched again to the Peninsula. Collecting the scattered forces of the French, he penetrated into the Pyrenees to relieve, if possible, Pampeluna and St. Sebastian. In this he failed. Wellington crossed the Bidassoa, and drove Soult before him step by step, and from one position to another, until he crossed the French frontier and retired upon Toulouse. Here he was once more defeated (14th April, 1814), just three days before the abdication of Napoleon.

Soult now submitted to Louis XVIII., but when the emperor returned from Elba he found himself unable to resist the spell of the old attachment. He joined the imperial army, was present at Waterloo, and after that famous defeat rallied the wreck of the disheartened host at Laon. After the Restoration he was sent into banishment, but contrived to obtain his recall in May, 1819, and made himself so acceptable to Charles X. that he was created a peer of France. The July revolution brought him once more prominently forward. He became a sincere and zealous Orleanist, and served Louis Philippe with unwavering fidelity. From 1832 to 1834 he was president of the ministry, a post which he again filled from 1840 to September, 1847. He then retired from public life to his residence at Soultberg, where he had collected a fine gallery of pictures, and where he died, 26th November, 1851. It should be noted that in 1838 he officiated as ambassador to England, and was present at the coronation of Queen Victoria. He was received by all classes with the welcome due to his indisputable military genius. (Napier, "History of the Peninsular War;" Salle, "Vie Politique du Maréchal Soult.")

SOUND. See ACOUSTICS.

SOUND, THE, a strait between the island of Zealand and the coast of Sweden, connecting the Baltic to the Cattegat. It is 36 miles long; breadth, from 10 miles at the widest part, to 2½ at the narrowest, opposite Elsinore; depth, 4 to 20 fathoms. The dues were formerly paid to Denmark, as having originally possessed the territory on the east side. In 1855 the United States refused to pay the impost, and in 1857, at a convention of fifteen of the chief maritime states held at Copenhagen, Denmark agreed to accept £3,900,000 in lieu of all future charges. England contributed about a third.

SOUND-HOLES, apertures in the soundboard of a stringed instrument, without which the instrument will not properly sound. In the lute, mandoline, guitar, zither, and several other instruments of those kinds the sound-hole is circular. The earliest viols also had a circular sound-hole, but for considerations of strength this was abandoned in favour of two nearly semicircular openings, the centre of the former circular sound-hole being now left solid. The next step was to place the curved holes back to back, following the curve of the *échancre* (the reversed curve in the middle of the side of a violin to let the bow pass easily). Then with the new violin-shape the old simple curve of the viol sound-holes gave way to the waving line of the familiar apertures, often called F-holes, from their resemblance to the Italic letter *f*. Stradivari was the inventor of this beautiful shape, which every great maker modified in some slight way, and which consequently is of immense assistance in determining the maker of an instrument.

SOUNDING-BOARD, a board placed over a pulpit or other place occupied by a public speaker, to reflect the sound of his voice, and thereby render it more audible. Sounding-boards are usually flat, and are placed horizontally

over the head of the speaker, but a superior form is a concave parabola, placed partly over and partly behind the speaker. They are seldom necessary in modern buildings, except when it is desired to utilize large areas not originally intended for public speakers. In the enormous area of the Agricultural Hall, London, in 1875, for instance, 20,000 people were enabled distinctly to hear the speaker's words by means of a very large sounding-board suspended over the platform, but great quietness was, of course, necessary on the part of the audience.

SOUNDINGS, in hydrography, are properly the depths of waters in rivers, harbours, along shores, and even in the open seas, it having now become an urgent necessity to find at the bottom of the ocean a rest for the telegraph wires; but the term is also applied to the nature of the ground at the bottom of the water.

If the depth of the water is comparatively small, a man, who is stationed for the purpose in the main or mizen chains, on the windward side, throws out a mass of lead, usually in the form of a frustum of a cone, and weighing 8 or 9 lbs., which is attached to one end of a line between 20 and 30 fathoms in length. On this line are fixed, at intervals of 2 or 3 fathoms, pieces of leather or cloth of different colours; and the mark which is next above the surface of the water when the lead strikes the bottom affords an indication of the depth.

That which is called the deep-sea lead weighs from 25 to 30 lbs., and is attached to a line of great length, on which at intervals are knots indicating the depths. The bottom of the lead is covered with a coating of tallow for the purpose of ascertaining, by the sand, shells, or other matter which may adhere to it, the nature of the ground.

When soundings are to be taken in the survey of a coast, a harbour, or the mouth of a river, the surveying ship and its boats are disposed at convenient intervals (suppose from 2 to 5 miles); their distances with respect to each other and to remarkable objects on the shore being determined by the usual trigonometrical observations. The boats then row or sail along the directions of the lines joining each other, sounding as they proceed at equal and frequent intervals of time, and thus the outline of the shoal, reef, coast, or river will be determined, as well as the depth of the water. All the soundings must be afterwards reduced to the depths below the surface of the sea at the level of low water.

In order that the rise and fall of the tide may be ascertained the ship should remain in its position during twenty-four hours, and at certain intervals of time the depth of the water should be observed by the sounding lead, or by means of a graduated pole, which is suffered to fall into the water, and is retained in a vertical position by means of a heavy weight at its lower extremity. An electro-magnetical apparatus has been invented by which the precise moment when the sounding lead strikes the bottom may be ascertained.

SOURABA YA, a city of Java, on the north coast, opposite the island of Madura, at the north delta mouth of the Kedirre, the largest river of Java. It has the best harbour in the island, and a large trade. It consists of a Javanese, Arabic, Chinese, and European town, has large churches and temples, fine gardens, a marine establishment, and dry docks, foundries, wharves, arsenal, &c., and a great trade in rice, sugar, coffee, indigo, cotton, and salt.

SOUSLIK (*Spermophilus*) is a genus of **RODENTIA** belonging to the squirrel family (*Sciuridæ*), inhabiting the northern parts of Eastern Europe and Asia, and extending in North America from Mexico to the Arctic regions. The sousliks resemble the *MARMOTA* (*Arctomys*) very nearly in appearance, but have large cheek-pouches, and the claw on the thumb is very small or altogether wanting. The tail is short or moderate, and the ears are very small.

The sousliks inhabit sandy districts, where they live in societies, in burrows. They pass the winter in a state of semi-torpority, and provide for their food during this season by laying up a store of roots, berries, and seeds. They sit in multitudes near their holes, and only one inhabits each burrow. The females remain separate from the males except during the breeding season, which is in May, and produce from five to eight young ones; these they bring up in burrows and cover with herbage. Some of the species have a liking for animal food, and prey on small birds and mammals.

The Common Souslik (*Spermophilus citellus*) is abundant in Central and Eastern Europe, and in Siberia. It has the face of an ashy gray colour, with a white line over each eye. It is grayish-brown above, undulated or spotted below, and has long black whiskers.

The Striped Souslik or Gopher (*Spermophilus tridecemlineatus*) is common in Canada and the United States. It is about 6 or 8 inches long, and of a chestnut colour, with seven yellowish-white lines running along the back, and between these six rows of small spots of the same colour.

SOUTH AMERICA, the southern portion of the American continent, which, stretching southwards from the Isthmus of Panama, presents a solid, compact mass of land, in one important respect closely resembling the northern half of the New World; for here also a long strip of the coast faces the north, thence, from about the fifth degree south latitude, gradually tapering to Cape Horn at the extreme end of Patagonia. Connected by the Isthmus of Panama, now being cut through, with North America, it has a coast, with few indentations, of about 13,600 miles in total length, to an area of about 6,000,000 square miles, and is bounded on the north-east and south-east by the Atlantic, and west by the Pacific. At the south-eastern extremity is the principal island group of the continent, the Fuegian Archipelago, which may by proximity, as well as on geological grounds, be regarded as a southerly continuation, being only separated by the narrow Strait of Magellan. Continuing through South America, the great range of the Americas is in its southern portion the most remarkable on the globe for its continuity of height. It reaches from the southern extremity of the continent along the western coast to about the tropic of Capricorn as a single chain. The average height of these Chilean Andes is not so great as further north, but Aconcagua, in the background of Valparaiso, rises to an altitude of 22,415 feet, and is the highest point of the whole western hemisphere. Beyond the tropic the chain is distinguished by a second ridge or cordillera running parallel at a considerable distance eastward of the one skirting the coast; and between these great ridges are the lofty plateaus of Bolivia and Peru, at an elevation of about 12,000 feet above the sea. Still further north, after drawing closer together in Ecuador, the cordilleras branch off in three distinct ranges, one running north-east along the coast of Venezuela, to form the high island of Trinidad at its extremity, the second north to Cape Gallinas, while the third passes north-west to form the Isthmus of Panama. On the eastern side of South America the most considerable heights are attained by the Organ Mountains, near Rio Janeiro, which here and there reach altitudes of 7500 feet. As in North America, there is a great central plain, extending between the Andes on the one hand to the Brazilian Mountains on the other, and stretching to the southern extremity. This region exhibits great diversity. Northward are the Llanos, or "level fields" of Venezuela, singularly flat, bordering on the Orinoco, by which they are largely inundated in the rainy season, and afterwards clothed with the rankest grasses, to be reduced to utter sterility by the succeeding heat and drought. Next, proceeding southward, occur the Selvas, or "forest" plains of the Amazon, the densest and most extensive woodland on the terrestrial surface, where

the magical beauty of tropical vegetation is seen in all its glory, interspersed with open patches of marsh and meadow. Further south are the Pampas, or treeless flats of the La Plata states. They include sandy and stony spaces doomed to permanent barrenness by saline impregnation, but consist chiefly of red calcareous soil, almost as level as the sea, part of which is covered successively with a luxuriant growth of grass, clover, and thistles; but it varies remarkably in its appearance with the season. As the spring advances the whole region becomes a wood of enormous thistles, which have suddenly sprung up to the height of 10 or 11 feet, and are in full bloom. Wherever there is a road or path it is hemmed in on both sides by the plants, and the view is completely obstructed. Not an animal is to be seen, for so strong and close together are the stems that, independent of the prickles with which they are armed, they render the country impassable, except along the regular thoroughfares. But the summer heat is not over before there comes a change. The plants lose their verdant appearance, the leaves shrivel and fade, the stems become dry and black. For a time they remain rattling with the breeze against one another, till the powerful pampero—a hurricane from the Andes—levels them with the ground, rapidly to decompose and disappear. The grass and clover then shoot up—the scene is again verdant; and the wild cattle return to graze upon the pasture. Owing to the great chain of mountains which traverses the course of the Pacific, only a very small proportion of the surface-drainage finds its way to that ocean, but it is conducted through the vast central plains to the Atlantic, thus affording magnificent highways of navigation. Throughout the continent, the close approach of the Andes to the western shore renders the streams flowing in that direction insignificant, while the eastward-bound rivers—the ORINOCO, the AMAZON, and the PLATA—are magnificent, traversing nearly the whole breadth of the continent. South America, considering its extent and vast volumes of flowing water, is singularly deficient in large lakes. One of the most spacious, Lake Titicaca, on the Bolivian table-land, overlooked by some of the grandest of the Andes, is remarkable for its height above the sea, 12,816 feet. The expanse has an outlet in the Desaguadero, but the stream does not leave the mountain region, losing itself in a highland swamp. In the present century, during the fever for South American mining, an English company had the skeleton of a brig transported from the coast of the Pacific to this elevated lake, and set it afloat upon its waters, the only vessel that ever sailed at nearly the same level with the loftiest of the Alps.

Minerals.—The Peruvians gathered gold from the deposits of their streams, and silver from the bowels of their mountains. The whole chain of the Andes is richly metalliferous, and is supposed by some to have been so called on that account—*anta* signifying, in the language of the Incas, metal in general. Humboldt calculated from mining records that in the three centuries following the year 1499 the mines of Mexico, Peru, and Brazil yielded to the whites a total amount of gold and silver of the value of £1,248,000,000 sterling. Brazil at present supplies diamonds, other precious stones, and some amount of gold; Chili, in its northern district a sterile mountainous desert, has stores of the purest silver ore, with copper, lead iron, bismuth, cobalt, antimony, arsenic, and quicksilver.

Botany, &c.—In the hot, humid, equatorial zone, or the basin of the Amazon, the vegetable kingdom exhibits a variety and profusion which is unequalled in any other

part of the globe, whether regard be had to the number of genera and species, the vast extent of the forests, the size and close grouping of the individuals, bearded and clothed from the roots to the extremities of the tiniest branches with orchids and flowering climbers. The explorer cannot advance a yard without using the hatchet to open a pathway through the underwood; and were it not for the interruption to progress offered by the rivers, the monkeys might travel hundreds of miles without once descending from the boughs to the ground. In this zone the forest-



Virgin Forest of America.

trees supply much valuable timber, with ornamental and dye woods, as mahogany and Brazil-wood. Some bear fruits used for food by the natives, as the well-known Brazil nuts of the shops, from which also a lamp-oil is extracted, while the hard thick shells in which the nuts are packed are employed for domestic purposes. Others yield a resin which thickens into caoutchouc. The cow-tree of Venezuela is so called from a juice exuding on incision, which has many of the properties of milk, and is obtained as a substitute for it.

No true heaths are indigenous to any part of the continent, while all the cactuses belong exclusively to its tropical districts, though known by introduction in other warm climates. The gigantic water-lily, *Victoria regia*, now raised in tanks in the conservatories of Europe, is peculiar to a few equatorial streams. Trees of the order Cinchonæ, which yield the celebrated Peruvian bark of medicine, are limited to tracts on the inland slope of the Andes.

To the southward vegetation becomes less and less tropical, never, however, assuming a European aspect, till at last in Patagonia and the adjacent islands an antarctic imitation of northern vegetation makes its appearance. Beech trees of new species, singular parasitical plants, Winter's bark, stunted barberries, and evergreen arbutus, with a trailing habit, also flourish here; and the traveller occasionally is astonished at seeing arborescent fuchsias in flower, with humming-birds flitting among their branches, in the midst of a snow-storm.

Zoology.—The largest quadruped peculiar to the south is the tapir. The jaguar is found in the tropical forests. The llama, and its congeners the alpaca and vicuna, of the same order of ruminants as the camel, but very inferior in size, strength, and intelligence, are limited to the Andes of Peru and Chili, where they are, whether wild or domesticated, important as wool-bearing animals. The dog was common previous to the coming of the Spaniards, but the horse and ox were entirely unknown, though now roaming free by thousands in the llanos and pampas, where they are captured by the lasso. Quadrumanous tribes abound in the equatorial region, distinguished from the monkeys of the eastern world by being more gentle, of smaller size, and having in most examples long prehensile tails, answering the purpose of a fifth hand. [See NORTH AMERICA.] The largest of all birds that take wing, the condor, is not found north of the equator. Humming-birds, of fairy-like diminutiveness and dazzling beauty, are exclusively an American family. Reptiles dangerous to man, the boa-constrictor, the rattlesnake, and the alligator, are found in the tropical provinces and the bordering districts. Wild bees of many species are indigenous, but the common hive-bee was introduced by Europeans. Insects are found everywhere, especially in the hot swampy districts, embracing many species of the noxious or venomous class, with brilliantly variegated butterflies, and fireflies illuminating the woods by night with their phosphorescent lustre.

Area and Population.—The following is the area and population of the various South American States, all of which are described in separate articles:—

SOUTH AMERICAN STATES.

	Area in square miles.	Population.
United States of Colombia, Federal Republic,	320,700	2,950,000
Venezuela, Republic,	440,000	1,800,000
Ecuador, "	248,400	1,066,000
Peru, "	504,000	3,000,000
Bolivia, "	500,900	2,000,000
Chili, "	124,000	2,350,000
British Guiana,	85,420	240,000
French "	46,850	32,500
Dutch "	46,100	69,300
Brazil, Empire of,	3,219,000	11,100,000
Paraguay, Republic,	57,000	200,000
Uruguay, "	69,800	445,000
Argentine Republic, or State of La Plata,	803,000	1,813,000

Total South American States, 6,465,170 27,065,800

The modern population of South America is largely coloured by the Spanish race, and there is a greater admixture of native blood than in the north.

Climate.—In relation to climate South America has in general a higher temperature than the north, having a much larger extent of surface within the tropics, while very striking inequalities distinguish its rainfall. The annual amount of precipitation is enormous over the whole valley-plain of the Amazon up to the higher slopes of the Andes; but on the opposite side of the range the coast of Peru is nearly a rainless region. This is occasioned by the direction of the trade-wind, which drifts the vapours from the Atlantic westward over the great central plain, till their further progress is arrested by the mighty mountain-wall.

SOUTH AUSTRALIA, a division of the British Australian colonies which, as at present constituted, might more properly be named Central Australia, as it occupies the centre of the continent, being bounded on the N. by the Indian Ocean; on the S. by the Southern Ocean; on the W. by 129° E. lon., and on the E. by 141° E. lon. northwards to 26° S., thence west to lon. 138° E. and thence north to the Gulf of Carpentaria, with a length from N. to S. of 1850 miles, and an extreme breadth of 650 miles. It has an area of 903,425 square miles.

As might be expected this vast colony—which is as large as Great Britain, France, the German and Austrian empires, and Spain all rolled into one—is a land of widely diversified features, having magnificent plains of agricultural land, mountain ranges stretching for hundreds of miles and wooded with Eucalyptus of large size, lovely and enchanting valleys, and arid plains, timberless, waterless, and desolate, yet beneath the surface teeming with untold metalliferous wealth. It would therefore be rash to conclude that many of the huge "wastes" of waterless scrub represent so much worthless area, all the richest mineral stores having been found in the kind of land described as rocky and scrubby. The far northern territory was an almost *terra incognita* until the parties engaged in laying the Overland Telegraph, which has a length of nearly 2000 miles, and affords direct communication between England and the Australian colonies by submarine connection, lifted the veil, and disclosed millions of acres of well-grassed country, fairly watered, and suitable both for pastoral purposes and tillage, where nothing but desert was looked for. Still a great portion of the interior is sterile and much is still unknown, while the desert lands have invited the introduction of camels, which have been found invaluable.

The northern territory differs so widely from the southern portion, and the interests are so diverse, that the two will doubtless have separate administrations in course of time. The southern boundary is marked by two very deep indentations. One of these great oceanic inlets, the Gulf of St. Vincent, is 40 miles wide at the mouth, and runs up into the land about 100 miles in a northerly direction, gradually narrowing towards the upper extremity. It has deep water throughout, no hidden dangers, and the oldest settled districts are chiefly on its shores. The gulf is well protected from the roll of the Southern Ocean by Kangaroo Island, which lies off the entrance, and forms with the main coast the channels of Investigator Strait and the Backstairs Passage. The former is the route of ships between Adelaide and Europe; the latter for vessels to or from Sydney, Melbourne, and Hobart. The island, of large size, received its name from the number of kangaroos found by its early visitors on the surface, which, never having been disturbed by man, were so tame as to allow themselves to be approached and knocked down like sheep. It was selected by the founders of the colony for their first location, but speedily abandoned for the mainland, where a tall thorny bush is now cultivated, originally confined to the island, which makes excellent hedges on the farms.

Spencer's Gulf, the second opening, much more extensive, is west of the preceding, separated from it by York Peninsula. This narrow tract was only known a few years ago as a region of sheep runs, but has now its Cornish miners developing the richness of the ores of copper.

Though without the bold mountain features of the sister-colonies to the eastward, the surface is diversified with hilly ridges and gently undulating grounds, pleasant valleys intervening, and great alluvial plains lying at their base. A range of high lands runs parallel to the east coast of Gulf St. Vincent through its whole extent, of which the principal summits are Mount Lofty, with an elevation of 2334 feet, at the back of Adelaide, with Mounts Arden and Brown further north, each rising to the height of 3000 feet. There is no lack of stately and beautiful timber in the settled districts, generally arranged in clumps, but the want of running water is severely felt in the summer season. The Murray has the lower part of its course within the province, but the river enters it to come to a somewhat ignoble end, after a long and useful ministry, being navigable for no less than 2000 miles. It discharges in Lake Alexandrina, a vast expanse of shallow water, which communicates with the sea by a narrow channel, not navigable by very large craft, and highly dangerous from the violence of the surf. The colony has no other permanently flowing water of any considerable extent, the Wakefield, Gawler, Torrens, &c., not being rivers of much importance. But there are numerous streams full to the brim and overflowing during the winter rains, and in most places water is to be obtained by sinking wells to the depth of from 20 to 100 feet, and often much nearer the surface. This spring water has frequently a brackish taste, derived from the aluminous nature of the subsoil, not agreeable to new comers, but there is nothing unwholesome in its quality, and after a time a predilection for it is acquired. For nine or ten months of the year the climate is highly agreeable, the weather fine, and the sky gloriously serene. On the coldest days, which are in July, the thermometer seldom falls below 48 degrees. Snow is unknown, and frost nearly so. A thin ice is only to be witnessed in the hilly districts, and is there a very rare occurrence. The only unpleasant season is the middle of summer, December and January, when the heat is formidable, and the fiery north wind carries along particles of hot impalpable dust.

In the southern portion, there are numerous lakes, some of them of very considerable size. The principal of these are Lake Torrens, 90 miles north of Spencer Gulf; Lake Eyre, still further to the northward; Lake Gairdner, and Lake Frome—all salt; with Lakes Alexandrina and Albert, through which the Murray flows, which are fresh or nearly so. These last communicate with the sea, and are navigable for steamers of light draught. Lake Gregory and Lake Blanche, which lie to the south-east of Lake Eyre, are believed to be connected with it in wet seasons. Lake Amadeus, of immense size, which belongs partly to Western Australia, has not been thoroughly explored. The Coorong, on the south-eastern part of the coast, is a long, narrow arm of the sea, which runs parallel with the coast-line for nearly 100 miles. In the south-eastern district there are several volcanic fresh-water lakes, of which the principal is the Blue Lake, lying in the crater of an extinct volcano known as Mount Gambler.

South Australia is pre-eminently a wheat-growing country, and may be termed the granary of Australia, exporting wheat and flour in large quantities to its sister colonies, so much so that both Victoria and West Australia have imposed protective duties on both these products. Barley is also raised with good returns; oats do not succeed so well. Potatoes are grown in quantity near Mount Gambier, and flax is being tried in the Barossa district and other parts. Hop culture also is receiving some attention.

Horticultural productions are well suited to the colony. Apples and pears will grow almost everywhere, oranges in many situations, and the vine thrives luxuriantly. Strawberries and raspberries do well in the hill districts, while the olive is daily becoming a source of increasing wealth. The mulberry thrives well, as in other parts of Australia, and everything, except perhaps cheap labour, points to success in the raising of silkworms. Perhaps the most important of the products of the colony is destined to be yielded by the vine. Wine-making has now thoroughly taken root, and the wine has met with much approval in Europe. Raisins of the finest quality are dried without difficulty, and the currant-grape grows readily and well, as do also almonds and figs, but the art of drying the latter does not appear to have been yet acquired by the settlers. A good deal of attention is now being turned to forestry, with excellent results.

With regard to live stock, the principal object for which sheep are kept is the production of wool. Over the southern half of the colony sheep-farming is very widely spread. The breed most in favour is the Merino. How extremely varied the quality of the land is may be seen from the fact that over many districts it takes 30 acres to keep a sheep, while in other parts 15 sheep may be reared on an acre. Of the 900,000 square miles, indeed, a very large proportion, nearly the whole of the centre, is almost absolute desert or salt marshes. Certainly some of the land that the early explorers thought was utterly irreclaimable has been found suited for a scanty stock of sheep, and even some of the scrub and seemingly useless grasses that troubled them are now found adapted for fodder. The most valuable and best wool-growing country is in the Midland district, consisting of a series of hills, well grassed, watered, and wooded, and stretching from the Murray Hills, near Angaston, in a northerly direction, to Mount Remarkable and the Flinders Ranges. Except in the southern region, watered by the Murray, and the north of the northern territory, where there are numerous rivers of moderate length, South Australia is comparatively waterless, and in rainless seasons the sheep farmers and agriculturists are liable to sad disasters. The colony has nearly 7,000,000 sheep. It is officially computed that of the 578,000,000 acres of the colony, 300,000,000 are suited for pastoral occupation. Of this 247,000,000 acres are held under lease in different ways. About 53,500,000 acres are inclosed, and this inclosure has tended greatly to improve the quality of the wool. Although the colony has only about 163,000 horses, still horse-breeding is becoming an important industry. By breeding them in the centre of the colony and taking them gradually northwards it is found that they become acclimatized to a tropical climate, and already a good trade is done in supplying remounts for the Indian army.

The land is sold on easy terms. Much is now done to encourage immigration, and there are few colonies which offer such a choice and scope for the industrious settler. The transfer of land is simple and safe.

The mineral wealth in precious metals is not, as far as is yet known, so great as that of Victoria, but there are vast deposits of copper and iron and some good silver-lead mines. Large deposits of copper occur wherever there are metamorphic and palæozoic rocks. Tin and bismuth are worked in small quantities. Coal is believed to exist. Marble and bitumen are the only other important minerals.

The flora and fauna are included under those of AUSTRALIA.

The trade of the colony, as distinct from the manufactures, consists principally in the export of its raw agricultural and mineral products; wine, however, is beginning to figure to a considerable extent in the returns, and its export is on the increase. The imports are Manchester

and Birmingham goods, farm implements, beer, spirits, food adjuncts, scientific instruments, articles of luxury, &c. The exports amount to nearly £7,000,000 per annum, of which £3,000,000 is for wool and £2,500,000 for wheat. The industries of South Australia do not appear to be very important from an English standpoint, and are mainly confined to the trades dependent on agriculture.

The commercial intercourse between South Australia and the mother country in recent years was as follows:—

	Imports from South Australia (exclusive of Gold).	Exports to South Australia.
1885,	£3,709,775 ...	£2,237,626
1886,	2,466,862 ...	1,518,152
1887,	2,811,157 ...	1,486,712

The chief articles imported from the colony into the United Kingdom are wheat (£1,600,000) and wool (£1,500,000). The exports thereto are chiefly apparel (£300,000), cotton goods (£250,000), iron (£100,000), woollens (£200,000).

The customs dues and the railways, which are all owned by the state, constitute the main items in the revenue. The greater portion of the public debt of the colony has been applied to the construction of railways and other reproductive works. Up to 1887 there were 1200 miles of railway in the colony, which had cost about £9,000,000.

Population, Government, Education, &c.—In 1885 the population was estimated at 320,057, among whom there were about 6000 natives. The Constitution of South Australia was granted by the Act 13 & 14 Vict. c. 59. The executive, like the rest of the Australian colonies (except Western Australia), consists of a governor nominated by the crown and subject to the jurisdiction of one of her Majesty's principal secretaries of state. He is assisted by an executive council, consisting of six ministers and some specially appointed members, upon whose advice he acts, except in a case in which it would be contrary to his instructions to do so; in such a contingency it is incumbent on him to refer the matter to her Majesty through the secretary of state. The governor has the power of appointing the ministers, of proroguing and dissolving Parliament, and has the prerogative of mercy in criminal cases. The ministry consists of six members, viz. the chief secretary, treasurer, attorney-general, commissioner of public works, commissioner of crown lands, and the minister of education. The Parliament consists of two Houses, the Legislative Council or Upper House, and the House of Assembly. The power of both Houses is equal, except that money bills must originate in the Lower Chamber. The members of the Upper House are elected for nine years, one-third retiring every three years. They must be either natural-born or naturalized subjects of the queen, resident in the colony for three years in the former case, and five in the latter. A property qualification is required in order to vote for the Council; but the Assembly is elected upon the basis of manhood suffrage, every man, whether natural born or naturalized, being entitled to vote, if over twenty-one years of age. Qualifications as an elector also qualify for a candidature for the Assembly, except in the case of clergymen and judges or government officials, all of whom are ineligible.

Education is secular, compulsory, and free to those who are unable to pay. Itinerant teachers are appointed to visit children who live at too great a distance to attend schools. Intermediate and higher education is provided for in the high schools and academies, the oldest of these being St. Peter's School, founded in 1848, and handsomely endowed by Captain Allen, Dean Farrell, and others. It was established for the benefit of members of the Church of England, but is open to scholars of other denominations. 'Girls' schools are plentiful, and, generally speaking, of a superior order, but their high fees seem to have had the

effect of driving many to the government institutions. There is one university, that of Adelaide, founded in 1875, with an annual grant from the colonial Parliament.

South Australia is well provided with facilities for public worship, though there are no state religious endowments. Every variety of sect has full and equal freedom of worship. The Church of England comprises 27 per cent. of the population; Roman Catholics, 15 per cent.; and the Wesleyans, 14½ per cent.

The public debt, dating from 1852, amounted in 1885 to £17,034,200. The whole of the existing debt was raised for productive public works, mainly railways, telegraphs, and harbour improvements.

History.—The survey of the south coast of Australia was begun in 1802 by Lieutenant Flinders, and from his report a South Australian Land Company was formed in 1832. The country was first colonized in 1836 by emigrants from Great Britain, and received its first governor in that year. In 1842 only 2500 acres were under cultivation, but in 1850 the population had reached nearly 64,000 persons. In 1855 responsible government was inaugurated, and in 1861 the northern territory was added to the colony.

SOUTH DOWNS, a range of chalk hills, South Sussex, England, extending from Harting, by Bognor, Steyning, and Lewes to Beachy Head, near Eastbourne; average height, 200 to 400 feet; highest points, Ditchling Beacon, 858 feet; Beachy Head is 475 feet. They are covered with smooth turf, and are pastured by a superior breed of South Devon sheep.

SOUTH POLAR COUNTRIES. See POLAR REGIONS and POLAR VOYAGES.

SOUTH, ROBERT, a celebrated English clergyman, was the son of a London merchant, and was born at Hackney, in Middlesex, in 1633. In 1648 he was a king's scholar in Westminster School, and in 1651 was admitted a student of Christ Church, Oxford. He took his bachelor's degree in 1655, became M.A. in 1657, was ordained the following year, and in 1660 he was elected public orator of the university. Soon after this he became chaplain to the chancellor, Clarendon, and was made a prebendary of Westminster in 1663, and a canon of Christ Church, Oxford, in 1670. He was a sound scholar and a zealous churchman, a champion of the divine right and of passive obedience, and he opposed vehemently both Protestant dissent and Roman Catholicism. When Sherlock published his "Vindication of the Holy and Ever-Blessed Trinity," South attacked him with great power of argument, and no little racy wit, for inculcating tritheism, and in the discussion which followed he was allowed to have had the best of the argument. He died, 8th July, 1716, and was buried in Westminster Abbey. His posthumous works were published in London, in 1717, with a "Life," and his "Sermons," which form his chief productions, have been reprinted several times (six vols. 1692; five vols. additional, 1744; four vols. Clarendon Press, 1842; two vols. Edinburgh, 1848; abridged, London, 1851 and 1859).

SOUTH SEA BUBBLE, the name given to a rash speculation in the time of George I. The South Sea Company was established in 1711 by Harley, earl of Oxford, as a means of relieving the public burdens. The floating national debt was thrown into a stock to pay 6 per cent. interest, and the proprietors were to have the monopoly of a trade to the coast of Peru. The company at once rose to a high position in the mercantile world, and was regarded as a sort of rival of the Bank of England. The government being desirous, in 1719, of getting rid of the unredeemable annuities granted during the previous two reigns, amounting to £800,000 per annum, these two corporations competed for the purchase, and at last the South Sea Company offered the enormous sum of £7,500,000. They had the right of paying off the annuitants, who ac-

cepted South Sea stock in lieu of their government stock; and two-thirds of them consented to the offer of eight and a quarter years' purchase. Large subscriptions opened by the company rapidly filled; its trade was regarded as a certain road to wealth, and in August, 1720, the stock rose to 1000! More subscriptions were opened, the directors engaging that after Christmas their dividend should not be less than 50 per cent. Numerous other financial schemes were started, and the whole nation seemed to be seized with a sort of madness. Men of all ranks, ages, and professions, and even women, flocked to Change Alley; and the very streets were lined with desks and clerks, and converted into counting-houses. Among these bubbles were a fishery of wrecks on the Irish coast, a scheme to convert salt water into fresh, to make oil from sunflowers, to extract silver from lead, and to make iron from coal. One ingenious projector published "an undertaking which shall in due time be revealed," in shares of £100, with a deposit of two guineas, and in the evening decamped with the amount of 1000 subscriptions. The South Sea Company itself, by proceeding against some of these bubble companies, gave the first alarm. The public mind being aroused, scrutiny was made into the company's own affairs; holders of their stock became anxious to realize, and by the end of September it had fallen from 1000 to 300. Many capitalists absconded, either to avoid ruinous bankruptcy, or to secure their ill-gotten gains; and the government became seriously alarmed at the excited state of public feeling. Thousands of families were at once reduced to beggary, and on every side might be heard execrations, not only against the company, but also against the ministry, and even the royal family. The matter was taken up in both Houses of Parliament, and a committee of inquiry was appointed, which brought to light a scene of infamous corruption. In order to procure the passing of their bill, the directors had given large bribes to the Earl of Sunderland, the Duchess of Kendal, Mr. Craggs, M.P., Mr. Aislabie, the chancellor of the exchequer, and others. The estates of the directors were confiscated, and applied to the benefit of the sufferers by the speculation. More than £1,000,000 of fictitious stock had been created for the purpose of bribery, and in the allocation of shares there was equally flagrant iniquity. The whole of the real stock of the company was divided among the losers, giving a dividend of about 83 per cent.; and by other schemes of adjustment the pressure of loss was so fairly and widely distributed, that the excitement gradually subsided. It is worthy of note that the only trade the company did in the South Seas was the single voyage of one ship in 1717.

SOUTHAMPTON, a town in Hampshire, forming a county of itself, a municipal and parliamentary borough, and one of the chief ports of the United Kingdom, is situated on a point of land between the river Itchen on the east, and the Test, or Anton, on the west. These rivers here unite to form the estuary called Southampton Water. The town is 70 miles in a direct line south-west from London, or 78 miles by the London and South-western Railway.

The Roman town of *Clauentum*, though a mile south-east of the present site of Southampton, may be regarded as its predecessor. It stood on a point of land formed by the winding of the Itchen, on the left or east bank of that river.

The foundation of the present town is ascribed to the Anglo-Saxons. There is reason to believe that the castle was early erected by them. Canute often made the town his residence. It was at a projection of the shore, near the mouth of the Itchen, traditionally known as Canute's Point, that this monarch is said to have rebuked his courtiers for their sycophancy in declaring that even the waves of the sea would obey his voice. In the "Saxon Chronicle" the town is called Hamtune and Suth-hamtun; in Domesday Hantone and Hentune. In the reign of Henry II. it had

four churches. Southampton was sacked by the French or Genoese fleet in 1338. The year after this disaster its defences were repaired and strengthened. Richard II. rebuilt the castle. In 1348 the town suffered terribly from the pestilence called the Black Death. Henry V. set sail from this port in August, 1415, at the head of the troops who, on the 26th of October following, gained the great victory of Agincourt. The inhabitants were actively engaged in the Wars of the Roses.

The county of the town comprehends the whole of the point of land between the rivers, and extends along the bank of the Itchen about 3 miles. The town is on a gravelly soil, somewhat elevated, on the bank of the Test, which washes it on the west and south sides. The principal street (High Street) runs north and south, and is divided into two parts by an ancient bar or gateway belonging to the old town wall, considerable portions of which, with the west gate and south gate, are still standing. Taken altogether, the High Street is one of the handsomest in England out of the metropolis. That part of it which is south of the bar was always included in the town, and is about half a mile long; the remainder, distinguished as Above-Bar Street, formerly belonged to the suburbs. The other streets lead from the main one at right angles, or are nearly parallel to it, and the suburbs known as Freemantle, Shirley, Newtown, Bevois Valley, and Portswood, on the north and west, have considerably increased in size and population in late years, the space occupied by streets and houses now exceeding 5 miles in circuit. The old town includes nearly the whole of the parishes of St. John, St. Lawrence, Holyrood, and St. Michael. The new town extends into the parishes of St. Mary and All Saints, and in the latter the new buildings consist principally of terraces and detached villa residences. The parishes of St. Lawrence and Holyrood, through which the High Street passes, contain the dwellings of many of the most respectable and opulent tradespeople; in the latter are the market-place, audit office, custom-house, several of the principal hotels, and the town quay. Southampton is well paved and lighted, is exceedingly clean, has tramway communication, and a good supply of water, principally obtained from Mansbridge, about 3 miles from the town, and Timsbury, near Romsey. The Winchester road, on the north of the town, passes through Southampton Common, which is beautifully wooded and 365 acres in extent, affording delightful walks, drives, and rides. The eastern side of the town is occupied by the poorer class of inhabitants; and a steam floating bridge across the Itchen connects the thriving suburb of Woolston with the town, and forms the communication by road with Fareham, Gosport, and Portsmouth.

The principal churches are Holy Rood Church, a large and ancient structure, with a tower and spire at the south-west angle. St. Lawrence's Church is small, and almost choked up by the surrounding houses. All Saint's Church is of Grecian Ionic architecture, and is much admired. These churches are all in High Street. St. Michael's, the oldest in the town, is in the Norman style, with a handsome tower between the nave and chancel. The Church of St. Mary—intended as a memorial of the late Bishop Wilberforce—was opened in 1879. There are places of worship for Roman Catholics, Independents, Baptists, Wesleyans, Unitarians, Jews, and Friends.

Southampton contains, besides the buildings previously mentioned, a guildhall, over the ancient Bar Gate in High Street, containing figures of Sir Bevis of Hampton and the giant Ascuparte; a grammar-school founded by Edward VI., in which Dr. Watts was educated, and which was rebuilt in 1874; the *Domus Dei*, or God's House, one of the oldest hospitals in England, having been built in the reign of Henry III., with St. Julien's French Protestant church attached to it; a depot of the Ordnance Survey of

the United Kingdom; a club-house for the Royal Southampton Yacht Club, erected in 1885; a sailors' home, savings bank, theatre, masonic hall, assembly rooms, government emigration depot, five banks, Alderman Taunton's school, diocesan school, girls' school of industry, Thorne's almshouses for forty-three widows, female penitentiary, South Hants Infirmary, built in 1838 in the Italian style, and enlarged in 1868, with a Gothic chapel annexed, lying-in-hospital, numerous schools, charitable and literary institutions. The Hartley Institution, in High Street, was opened in 1861, for the advancement of natural history, astronomy, classics, and Oriental literature, and contains a public library, museum, observatory, &c. In 1872 a school of science, with museum and art gallery, was erected in the rear of the institution. Southampton is also the seat of a county court and a coastguard station. There is a cemetery 15 acres in extent on the common. There are also two handsome public parks at the north of the town, and several fine hotels. Regattas take place every summer on Southampton Water, under the direction of local clubs, and races are held in autumn on the common.

Southampton Water is a fine inlet of the sea, 7 miles long, and about 2 wide. The Isle of Wight, which intervenes between it and the English Channel, forms a magnificent natural breakwater; and by intercepting the tidal wave, gives the inlet the advantage of four tides in the twenty-four hours. Good anchorage is afforded, and ships may load and unload alongside the town quay, close to which is the custom-house. A pier of wood and stone, which projects 400 yards from the shore, forms a convenient landing-place for passengers from steamers, as well as a promenade for the inhabitants and visitors. It has a carriage drive to its extremity. The shores are very picturesque; and on the east side are the ruins of Netley Abbey, and the military hospital. [See NETLEY HOSPITAL.] The abbey was founded in 1229 by Henry III. for Cistercian monks. The refectory and kitchen are in tolerable preservation, and there are some fine remains of the abbey church, which was cruciform, and had at its east end a noble window. The whole is embosomed in wood, and near it is a modern tower, commanding a fine view of Southampton Water and the Isle of Wight.

Southampton was the birthplace of Isaac Watts, D.D., to whom a monument has been erected, and also of Thomas Dibdin. A marble statue of Lord Palmerston was erected in the town in 1869, and in 1885 some public ornamental gardens were laid out opposite the Queen's Terrace, containing a colossal monument to the memory of General Gordon.

There are few manufactures in the town—its prosperity depending almost entirely on its commerce. The principal industrial occupations are carriage-building, rope-making, and shipbuilding. The latter is extensively carried on, though the vessels built are mostly small. Southampton has a large coasting trade, and a considerable commerce with foreign ports and the colonies. Very large and convenient docks, capable of floating the largest vessels, have been constructed on the eastern side of the town, entirely for the service of steam navigation. The South-western Railway runs to their very edge. There are also very extensive dry docks. In 1876-77 the docks were considerably extended, and again in 1886-87.

In 1841 the mail steamships to the West Indies commenced running from this port, and it is now the headquarters of the West Indian Mail Packet and Union Steam Companies, but the Peninsular and Oriental Company have removed their steamships to London. The German Lloyd and several foreign lines of steamers make Southampton a port of call. There is frequent communication with Havre, Ireland, the Isle of Wight, and the Channel Islands. The chief articles imported are butter, cheese, eggs, silk, and indigo—the quantities received of the two latter being

larger than at any other port in the kingdom. The exports are chiefly cotton, linen, and silk manufactures, and haberdashery and millinery. The number of vessels registered as belonging to the port in 1887 was 330 (80,000 tons). The entries and clearances each average 3400 (180,000 tons) per annum.

The municipal borough is divided into five wards, and is governed by a mayor, ten aldermen, and thirty councillors. Courts of quarter sessions are held.

The parliamentary borough is co-extensive with the town and county, and has an area of 2004 acres. It has returned two members to the House of Commons since the 23rd Edward I., the right of election down to the Reform Act of 1832 being vested in the inhabitants paying scot and lot. In 1801 the population was only 7913; in 1851 it was 35,305; in 1861 it had risen to 46,960; and in 1881 to 59,916.

SOUTHAMPTON or HANTS. See HAMPSHIRE.

SOUTHAMPTON, EARL OF. Henry Wriothesley (pron. *Rotsley*), the third Earl, an English statesman and the patron of Shakespeare, was the grandson of Henry VIII.'s chancellor, and born in 1573. He was scarcely twenty when, in 1593, Shakespeare dedicated to him "Venus and Adonis;" and it was to Lord Southampton again that, in 1594, his second poem, the "Rape of Lucrece," was dedicated. Rowe, in his "Life of Shakespeare," says, on the authority of Davenant, that Southampton gave him (Shakespeare) at one time £1000 to "enable him to go through with a purchase which he had heard he had a mind to." Of Southampton's love of the drama there is a record in a letter of 1589, in which the writer, speaking of him and Rutland, says: "They pass away the time in London merely in going to plays every day." Southampton engaged in the insurrection of his friend Essex in 1601, and was condemned to death. He was, however, only imprisoned, and was released on the accession of James. He died in the Netherlands in 1624.

SOUTH'COTT, JOANNA, a remarkable religious enthusiast and visionary, was born of humble parentage in Devonshire in 1760. She received no education, and was employed, chiefly at Exeter, as a domestic servant. For some years she was a member of the Established Church, but about 1790 she joined the Methodists, and for the next two years was an example of assiduity in attendance at their devotional meetings. Among the visitors at the house where she was employed was a man named Sanderson, who believed himself to be inspired, and the notion of being possessed of similar powers was gradually formed in the mind of Joanna. At first she exercised her powers in a humble way, limiting herself to predicting changes in the weather, &c., but becoming confirmed in her delusion, she gradually extended her claims, which gained for her considerable notoriety. As her influence extended and the number of her followers increased she issued a stream of prophecies in prose and doggerel verse, and ultimately claimed to be the woman referred to in Rev. xii., issuing sealed papers to her followers for money, which she promised would assure their eternal salvation. On the invitation and at the expense of Sharp, the engraver, she came to London, and here she attracted thousands of followers, among whom were many persons of good education and respectable position in Society. In 1803 were published "A Warning to the whole World, from the Sealed Prophecies of Joanna Southcott, and other Communications given since the Writings were opened on the 12th January, 1803;" in 1804, "Copies and Parts of Copies of Letters and Communications written from Joanna Southcott and transmitted by Miss Townley to Mr. W. Sharp in London;" in 1813-14, "The Book of Wonders, in Five Parts;" and in 1814, "Prophecies concerning the Birth of the Prince of Peace, extracted from the Works of Joanna Southcott." In 1814 she announced that although she was upwards of sixty years old, she was miraculously

pregnant with a second Shiloh or Prince of Peace, and her expectations being confirmed by a medical man named Reece great excitement was caused among her followers, a magnificent cradle was prepared, and regal preparations were made for the expected advent. The time of the nativity was fixed for 19th October, 1814, and that day and the succeeding night her home was surrounded by a crowd of her followers, but when midnight came the expected event had not occurred, and it was officially announced that the prophethood had fallen into a trance. In reality poor Joanna was suffering from dropsy, and this caused her death, 27th December, 1814. Dr. Reece, who was her medical attendant, published "A Correct Statement of the Circumstances that attended the Last Illness and Death of Mrs. Southcott" (London, 1815), but many of her followers refused to believe that she was dead, and even after her internment some believed that she would rise again and fulfil her prediction. In 1851 there were still four congregations of Southcottians in England, comprising 198 persons. There seems to be every reason to believe that Joanna Southcott fully believed in her mission, and though insane she was not consciously an impostor. Shortly before her death she declared that "if she had been misled it was by some spirit, good or evil."

SOUTHEND, a watering-place of England, in the county of Essex, situated on the Thames, 41 miles from London. It is a clean, quiet, well-built, well-arranged, and old-fashioned watering-place. The sands are firm and level, and the inland views well wooded and picturesque. The pier is one of the largest in England. There is a good sea-wall and promenade for visitors, considerably over a mile in length. There are a public hall, convalescent home, church, and Congregational and Catholic churches, and the Baptists, Wesleyans, and others have chapels. Southend, originally a hamlet in the parish of Prittlewell, first sprang into notice as a watering-place in consequence of a visit of Queen Caroline and Princess Charlotte in 1804. The population in 1881 was 7979.

SOUTHERN CROSS. See CROSS, CONSTELLATION OF THE.

SOUTHERN, THOMAS, a dramatist of the Restoration, whose friendship for Dryden confers honour upon both, was born in Dublin in 1660. He came to London to study for the bar at eighteen, but adopted dramatic literature as a profession, and when only twenty-two had the honour of a first representation ("The Loyal Brother," 1682). His piece was an attempt covertly to win favour for James duke of York, afterwards James II., then already highly unpopular. Dryden wrote both prologue and epilogue to it. In 1692, when Dryden's tragedy of "Cleomenes" was produced, it was Southern who finished it for him, for Dryden, though only just over sixty, was rapidly growing feeble. Southern now began to improve in his own plays, and his best work was produced under William III. "The Fatal Marriage" (1694) and "Oroonoko" (1696) are his finest plays. The latter especially is an excellent production, and its strong anti-slavery sentiment dignifies it in our eyes. Southern died, very well-to-do, in 1746. He was a very sharp man of business, and made more money out of his plays than Dryden. He was also an officer in the army, and always ready to dabble in military-commercial affairs, &c.

SOUTHERNWOOD. See ARTEMISIA.

SOUTHEY, ROBERT, was one of several sons of an unprosperous linen-draper in Bristol, where he was born, 12th August, 1774. After some preparatory study he was placed at Westminster School, the expense of his education from this time having been borne by the Rev. Herbert Hill, his maternal uncle. In 1792 he was sent to Balliol College, Oxford, with a view to his entering the church. But his enthusiastic temperament led him to adopt the opinions which the French Revolution had spread both in France

and England; and he went to the extreme of freethinking both in religion and politics. In 1794 he left Oxford. He and a fellow-townsmen, a young Quaker named Robert Lovell, in the same year published a volume of poems under the names of Bion and Moschus, and Southey's "Wat Tyler," a revolutionary dramatic poem, is of this year. Lovell had married a Miss Fricker, of Bristol; and in November, 1795, Southey and Coleridge on the same day united themselves to her two sisters. The three had formed a plan to go out together to North America, and there to establish what they called a Pantisocracy (Gr. *pan*, *ison*, all-equal government), in which they were to live without either kings or priests, and to renew the patriarchal or the golden age. But this plan was never carried into effect, for neither of the three universal reformers had any money for the passage. Southey soon after set out for Portugal with his uncle, who had been appointed chaplain to the English factory at Lisbon. He returned to Bristol in the summer of 1796 and claimed his wife. He now wrote "Joan of Arc." In 1798 he removed to London, and entered himself a student of Gray's Inn, but he never prosecuted the study of the law. He was again in the Peninsula in 1800 and 1801, and on his return home in the latter year went to Ireland as private secretary to the Right Hon. Isaac Corry, chancellor of the Irish exchequer. He retired from office with his patron, and then returning to England established himself at Greta, near Keswick, in Cumberland, where he spent the rest of his life.

Long before this time Southey had abandoned his democratic and free-thinking creed, and adopted one diametrically opposite. During the rest of his life, as is well known, he was an ardent, uncompromising, and somewhat intolerant monarchist and churchman, pronouncing and maintaining doctrines, both ecclesiastical and political, which were in some respects even beyond Conservative standpoints.

In November, 1813, on the death of Mr. Pye, he was appointed poet laureate; and in 1821 received the degree of LL.D. from the University of Oxford. In 1835 a pension of £300 a year was bestowed upon him by the government of Sir Robert Peel. It is understood that he had before this time been offered a baronetcy, and had also more than once declined being brought into Parliament. Having lost his first wife he contracted a second marriage, 4th June, 1839, with Caroline Anne, daughter of Charles Bowles, Esq. of Buckland, North Lymington, a lady long known in the literary world. His later years were overclouded by mental imbecility. He died 21st March, 1843.

His publications are very numerous. The earliest of any importance was an epic poem called "Joan of Arc," published in 1796. In the following year appeared some "Letters from Spain and Portugal." In 1802 "Thalaba the Destroyer," a metrical romance, made a considerable impression on the public. "Madoc," a poem in two parts, and the "Curse of Kehama," were issued in 1805 and 1810. In 1817 "Wat Tyler," a dramatic poem, written in a vein of ultra-Jacobinism in 1794, was surreptitiously published. Among his other literary labours, both previously and subsequently to this period, may be mentioned "Amadis de Gaul," the "Chronicle of the Cid," and various other translations from the Spanish and Portuguese; his admirable "Life of Nelson," two vols. 8vo, which still enjoys a deserved popularity; a "History of the Peninsular War;" a "Naval History of England," in Lardner's Cyclopædia; a "History of Brazil;" and "Lives of Cowper, Wesley, and Bunyan," which are masterpieces of biographical composition. "The Doctor," which was never acknowledged by Southey, but is now known to have proceeded from his pen, was published in 1834-35-37-39. He was a steady contributor to the *Quarterly Review* from its establishment.

In 1837 "The Poetical Works of Robert Southey" were

collected by himself, ten vols. 12mo. In 1849 appeared the "Life and Correspondence of the late Robert Southey," edited by his son, the Rev. Charles Cuthbert Southey, M.A., in six vols.; and in 1856 a "Selection from his Letters," in six vols., edited by his son-in-law, the Rev. J. Warter, B.D.

SOUTHING, in astronomy. The southing of a planet or star or other heavenly body is the instant at which it is due south of the observer, that is, when it passes the meridian of longitude for the place where he is stationed. This is also the moment at which they appear highest in the heavens above the horizon.

SOUTHPORT, a handsome town of England, in the county of Lancashire, on the estuary of the Ribble, 212½ miles from London. It is much resorted to as a fashionable watering-place, possessing, as such, very considerable attractions. There are assembly rooms, libraries, excellent hotels and lodging-houses, one of which, the Palace Hotel, is a handsome building, with a frontage of 200 feet, and commands a good sea-view; a fine town-hall, hydropathic establishment, &c. In 1865 the pier was extended and widened, and is now about a mile in length and 24 feet wide, with a tramway along it. The sands are very convenient for bathing, and there are fine sea promenades and walks. In 1871 some extensive and well-arranged public baths were constructed. In 1871 an aquarium, scarcely inferior to that of Brighton, and winter garden were opened. A handsome park or pleasure ground was laid out in 1868. The environs of the town are very picturesque and interesting. There are numerous churches and chapels. Birkdale Park is a fashionable suburb of Southport. In 1851 the population was only 5391: in 1881 it was 32,191. The town was incorporated in 1867, and is governed by ten aldermen and thirty councillors, including the mayor.

SOUTH SEA. See PORTSMOUTH.

SOUTHWELL, a market-town and bishop's see of England, in the county of Nottingham, 12 miles S.E. from Nottingham, and 142 from London by the Midland Railway, is situated on an eminence near the small river Greet, and consists of well-built houses and well-paved streets. The first bishop of Southwell was enthroned in 1884. The cathedral, a noble minster, was founded by Paulinus, archbishop of York, in 627. Its total length is 315 feet, of which the choir occupies 120 feet; and its breadth in the nave is 59 feet, traversed by eight arches supported by cylindrical pillars 15 feet in circumference. The nave is a fine specimen of Norman architecture, very perfect; the roof has been renewed. There are stained glass windows, one of "pitchwork" glass; and the east window is very curious, the lower tiers being filled with fine old stained glass taken from the Templars' Chapel in Paris at the Revolution. The archbishops of York formerly had a palace near the minster at Southwell. Its ruins are picturesque and interesting, mainly of the Decorated Gothic style, but with Perpendicular Gothic windows, triplacings, and chimneys. Southwell was a Roman station, and traces of a Roman camp are seen on Burridge Hill. The population in 1881 was only 2866.

SOUTHWELL, ROBERT, was born in 1560 of an ancient family in Norfolk. He was educated on the Continent, and in 1578 entered the Society of Jesuits at Rome. In 1585 he was appointed prefect of the English Jesuits' College in that city, and was soon afterwards sent to England as a missionary. Here he was accused of being concerned in a plot against the government, and was committed to the Tower. In the course of three years he was ten times subjected to the torture; he at length confessed himself a Jesuit, and that he came to England for the purpose of making proselytes to the Roman Catholic faith. Under the Act passed in 1585 (27 Eliz. c. 2), he was tried for treason 20th February, 1595, found guilty, condemned to death, and executed at Tyburn on the following day.

His principal works, which have ever been in favour with Roman Catholics, are the following:—"Peter's Complaint," with other poems (1593); "Mæonia, or certain excellent Poems and Spirituall Hymns" (1595, 4to); "The Triumph over Death" (1595); "A Short Rule of Good Life," 8vo; "Mary Magdalen's Funeral Tears" (1609). His complete prose works appeared in 1828 and his poetical works in 1858. See Bishop Challoner's "Martyrs to the Catholic Faith" (new edition, Edinburgh, 1878).

SOUTH'WOLD, a seaport and market-town and municipal borough, 36 miles N.E. by N. from Ipswich, and 117 miles from London. The town clusters on a hill overlooking the surrounding country, and terminating seaward in a bold cliff. Inland it gradually sinks towards the marshes, which are drained by the river Blythe. The beach here is shingle, and a broad tongue of the same material stretches across the entrance of the port, which is formed by the mouth of the Blythe, and protected by long stout timber piers. The town, which rose on the decline of Dunwich, is a strange mixture of old and modern houses, and wears partly the aspect of a shipping port and partly that of a popular watering-place. The church, on the north-west side, is a stately Perpendicular edifice, of flint and stone, with a western tower 100 feet high, and two low hexagonal towers at each angle of the eastern end of the chancel. The porch is a fine specimen of Tudor Decorated architecture, and altogether the church is one of the finest in the county. It has recently been restored. The town-hall is a modern building. Southwold has some small iron-works, salt-works, rope-works, and a brewery. A large fishery of shrimps and soles is carried on here, and there are some exports of malt and salt, and imports of coal. In matters of customs business Southwold is tributary to Lowestoft. The bay is deep and spacious, and could accommodate all the ships in the British navy. It was the scene of a fierce battle between the English and Dutch, 28th May, 1672. The former lost four, and the latter three ships, but the Dutch were compelled to fly, and were hotly pursued to their own coasts. The gallant Earl of Sandwich was killed in the action by the blowing up of his vessel. The population of Southwold in 1881 was 2107.

SOVEREIGN. In the time of Henry VII. the ryal or rose noble was worth 10s. of the money of that day (the angel being worth 6s. 8d., the original value of the noble); and the wealth of England had increased so much that this gold coinage seemed too small. Henry VII. therefore struck a double ryal piece, which he named the *sovereign*; a large gold coin measuring an inch and a half across, and weighing 240 grains, that is, close upon twice the weight of the present sovereign. The obverse bore the king enthroned, a fine likeness, and a highly artistic work; the reverse a double (Tudor) rose charged with the English shield. [See an excellent representation of this coin on Plate IV., COINS.] The new coin was certainly the handsomest piece of money then current in Europe. It was not coined in very large quantities under Henry VII. Henry VIII. coined sovereigns pretty freely, and even added two-sovereign pieces, and half-sovereigns, and gold quarter-sovereigns as well, altering the device of the reverse. Edward VI. even added the triple sovereign (equal in value to £6 at present rates) to the other gold coins. Elizabeth added a half-quarter-sovereign in gold (making up a total of twenty distinct kinds of coins issuing from her mint, the largest number ever struck at one time in England), and had the merit of restoring the purity of the coinage, which Henry VIII. had lowered. Curiously enough the queen had to encounter much opposition in this latter part of the work, which was highly unpopular with her subjects.

James I. found the pure coinage of Elizabeth raised in value, so that the sovereign and the double ryal or rose ryal (the same with the double rose noble), being coins of the

same value but of different mintage, were now worth 30s., though nominally twenty-shilling pieces; and they passed at the higher rate during the greater part of James's reign. In fact James finally placed the figure 30 upon the sovereign and 15 upon the spur-ryal (the half-sovereign piece). He introduced at this point a new twenty-shilling piece, which he hoped to make the beginning of an international coinage between Scotland and England, whose systems were then extremely diverse. This he called the *unite*, and from a device upon it, it was popularly called the *laurel*. James felt strongly his imperial position as King of Great Britain, and he marked this by copying the Roman imperial laurel as his headgear on the coinage, a decoration then used for the first time in England.

At the Restoration the coinage was greatly simplified, and the twenty-shilling piece, from the circumstance of its gold coming from the Guinea coast, began to be called guinea. Its value by accident increased from twenty to twenty-one shillings, and the guinea passed as twenty-one shillings from that time. In the reign of George III. a twenty-shilling piece was once more introduced: it received the old name of the sovereign, and by its superior facility of division soon drove out the guinea.

In 1816, as the coinage was somewhat irregular, the Coinage Act was passed, and by this Act, which still regulates the fineness of our coins, the gold standard was fixed at 22 carats fine, i.e. 22 parts out of every 24 must be pure gold=916 fine. This is standard gold. The value of the sovereign is exactly fixed by the further regulation that 40 lbs. Troy of standard gold is coined into 1869 sovereigns. One pound Troy of standard gold therefore makes £46 14s. 6d., and one ounce £3 17s. 10½d. Wherefrom we see that £1 of standard gold must weigh 123.27417 grains, out of which 118 grains (=7.32 grammes) are of fine gold, and the remainder almost all of copper and a little silver.

The sovereign (England), has	7.32	grammes	of pure gold.
The 25-franc piece (France)	7.26	"	"
The 20-mark piece (Germany)	7.16	"	"
The 5-yen piece (Japan)	7.50	"	"
The half eagle (United States)	7.52	"	"

When a sovereign falls below 122.5 grains, which is 7.93787 grammes in weight, it is officially light, and is not a legal coin, but merely bullion, and bankers, government officials, and other authorities are bound to withdraw them from circulation if tendered as coin.

The term *sovereign* is an error of folk-lore, having nothing to do with "reign," as would appear on its face. The word should be *soveran*, and is from the French *souverain*, which in its turn is from the Latin *supernus*, celestial, supreme.

A former coin of Austria, worth three ducats or about £1 8s., also bore the name of sovereign. It is not now in existence.

SOW. See HOG.

SOW-THISTLE (*Sonchus*) is a genus of plants belonging to the order *COMPOSITÆ* and tribe *Cichoracæ*. The species are annual or perennial herbs, often succulent, brittle, with a milky juice. The most common species is the *Sonchus oleraceus* (the common sow-thistle), found generally in waste places and cultivated ground all over the world. It is an annual, growing to a height of 2 or 3 feet, and has hollow much-branched milky stems, lanceolate sharply-toothed leaves, and small yellow flowers. It was formerly eaten in some places as a salad. *Sonchus arvensis* (corn sow-thistle) is frequent in corn-fields in Britain, and is also found in Europe, North Africa, and temperate Asia. It is a perennial with a creeping root-stock, sharply-toothed long leaves and large yellow flower-heads, of which the stalks and involucre are thickly clothed

with glandular hairs. Another species, *Sonchus palustris*, a perennial growing to the height of from 5 to 9 feet with very long leaves, is very rare in marshes in England; it is found in Europe from Denmark southward. Some of the foreign species are cultivated in conservatories for the sake of their foliage.

SOY is a sauce prepared from the beans of a leguminous plant formerly called *Soya hispida*, but now referred to the genus *Glycine*. This species is a native of tropical Asia, an erect hairy plant with pea-like flowers in axillary racemes, and oblong hairy pods containing from two to five ovate compressed seeds. In preparing the soy the seeds are boiled with water nearly to dryness, then put in wide-mouthed jars with water and sugar, and exposed to the sun and air. Every day they are well stirred; and when the fermentation is completed the mixture is strained, salted, and boiled, and skimmed until clarified. The soy is of a clear brown colour and a peculiar flavour, like curds in consistency. Soy is in general use as a condiment in China, Japan, &c., and is imported to Europe for use with fish.

SOYMI'DA is a genus of plants of the order *MELTACEÆ*. *Soymida febrifuga*, the sole species, is a large forest-tree, a native of India, where it is particularly noted on account of its bark. This is of a dull red colour, of a fibrous nature, and astringent, and has been much employed there for the cure of intermittent fevers. It has been also used in this country in typhus fever.

SPA, a town in the province, and 17 miles south-east of Liège, Belgium, celebrated for its mineral springs. The waters in the town and neighbourhood are of various composition, one of the most frequented being chalybeate. Being the earliest springs much frequented, and celebrated from a remote period, the name passed into a general term. The town is beautifully situated, and has under one roof a theatre and a ball-room, but gaming was suppressed in 1872. The famous wooden toys of Spa are stained by being steeped in the mineral waters.

SPACE AND TIME, in mathematics. We do not here propose to enter into any discussion of the doctrines of metaphysicians upon the idea of space, or whether it is innate or acquired. Space and time are essential to thought, and are, come by the notions how we may, necessary attendants on our own consciousness of existence. It is possible for imagination to picture the annihilation of all things, itself included, or to fancy that it can form such a picture, which is the same thing; but what then would remain? Infinitely extended empty space, lasting through infinitely extended time.

In these ideas we have the foundation of the mathematical sciences; for from space follows form, which is the conception of the manner in which one part of space is separated from the rest, and from the investigation of forms arises geometry. Again, time is only apprehended by succession of events or ideas, and succession or repetition gives the notion of *numbering*. And though *collection* is sometimes stated to be the leading idea in *number*, which may be the fact, yet it may be asserted that number in the last sense is not the object of arithmetic, except as furnishing the subject of numbering. The leading phrases of arithmetic suggest the idea of time, and are derived from it. How often is 2 contained in 12? Six times. The 2 presented to the thoughts at six different times is the mode in which the collection of 12 is counted by twos.

From both space and time we derive the notion of direction, but in very different manners. The extremities of a portion of space give the idea of a point of space, a fundamental notion of an indivisible index of commencement or termination. The extremities of time give the notion of points of time, or indivisible portions of duration. No point of space contains any space; no point of time

lasts any time. If we choose a point of space or a point of time, we can in our thoughts set out from the former in an infinite number of different ways, from the latter in only two. This is the law of thought, upon which it is useless to speculate; but it is followed by important consequences.

From space and time also we conceive the idea of infinity. That space and time are unbounded, is the simple consequence of their being necessary to our notion of the existence of anything; we speak of our conception of them. For if it could be imagined that space ceased at a certain boundary, it would be as easy to make it cease in our own neighbourhood; and if duration could be imagined to have an end, it would not be difficult to place ourselves in thought within five minutes of that end.

If we estimate the reality of a conception by its necessity, which is what we do when we settle the pre-eminence of space and time among our ideas, then it is certain that the conception of infinity is as real as that of space or time, being essentially united with them. Many mathematicians try to deny this, and substitute various modes of speaking to avoid the introduction of the idea. It is true that the notion of infinite is one which it is difficult to use without falling into error—a very good reason for avoiding it until the understanding has been well practised in mathematical deduction, but none for denying its existence.

Is space empty? is a question often put. Usually the answer given is that it is empty save for the luminiferous ether, the medium which allows light and the heat, actinic force, electricity, and other vibrational states which accompany light, to pass from sun and stars to our earth. The subject attracted the notice of Siemens, who, together with Captain Abney, gave much attention to it. In his speech as president of the British Association (for the promotion of science) in 1882, Siemens noted that the evidence was continually, though slowly, augmenting against the emptiness of space; and that every late indication tended to show that highly attenuated matter of aqueous nature, together with derivative carbon compounds similar to benzine, ethyl, &c., exist in regions far beyond the earth's atmosphere. It is quite certain, from spectroscopic and photometric observations, that absorption of light, due to the presence of hydrocarbons, takes place somewhere between the earth's and the sun's atmosphere. Such discoveries, simply as they are stated, fill the mind with astonishment, for not only are the vast spaces of our system thus materially interconnected, but also the innumerable solar systems of which the whole immeasurable universe is framed.

SPADIX is a form of the inflorescence of plants in which the flowers are sessile and closely arranged around a thick fleshy axis, and the whole surrounded by a large leaf or bract called a spathe. The spadix is characteristic of the Arum order (Aroidaceæ), and also of the palms; in the latter it is compound or branching. See SPATHE.

SPAGNOLETTO. See RIBERA.

SPAIN (*España*), a country in Europe, occupying the greater part of that peninsula which is divided from France by the mountain range of the Pyrenees. The most northern point is Cape Ortegal (48° 46' N. lat.), and the most southern Tarifa (36° 2'). From its most north-western point, Cape Finisterre, to the most eastern, Cape Creux, is a distance of 650 miles; from Tarifa to Fuentarabia, on the Bay of Biscay, near the boundary of France, about 560 miles; and from Cape Ortegal to Cape de Gata, the most south-eastern promontory, 556 miles. The average length is 560 miles, and the breadth 380 miles.

Spain is bounded on the E. by the Mediterranean, on the S. by the Mediterranean and the Atlantic, on the W. by Portugal, on the N.W. by the Atlantic, on the N. by the Bay of Biscay, and on the N.E. by France.

Area, Population, and Colonies.—The kingdom of Spain, formerly divided into fourteen states or provinces, is now, inclusive of the adjacent islands, divided into forty-nine provinces, as follows:—

Old Provinces.	Towns from which the smaller divisions are named.
Andalusia . . .	Seville, Cadiz, Huelva, Cordova, Jaen.
Granada . . .	Granada, Malaga, Almeria.
Extremadura . .	Badajoz, Caceres.
New Castile . .	Madrid, Toledo, Cuenca, Guadalajara.
La Mancha . . .	Ciudad Real.
Murcia . . .	Murcia, Albacete.
Valencia . . .	Valencia, Alicante, Castellon de la Plana.
Catalonia . . .	Barcelona, Tarragona, Lerida, Girona.
Aragon . . .	Saragossa, Huesca, Teruel.
Basque provs.	Navarre . . . Pamplona.
	Alava . . . Vittoria.
	Guipuzcoa . . St. Sebastian.
	Biscay . . . Bilbao.
Old Castile . .	Burgos, Valladolid, Soria, Palencia, Segovia, Avila, Logrono, Santander.
Leon . . .	Salamanca, Leon, Zamora.
Asturias . . .	Oviedo.
Galicia . . .	Coruna, Lugo, Orense, Pontevedra.
Balearic Isles.	
Canary Isles.	

The area of continental Spain is 191,100 square miles; including the Balearic Islands and the Canaries, 197,767.

It has been calculated that in the time of Julius Cæsar, Spain must have had 78,000,000 inhabitants, and yet in 1688 it did not contain more than 8,000,000. But from that time forward there has been almost a constant increase, and in 1886 the population was estimated at 17,000,000.

The total area of the colonial possessions of Spain is 163,876 English square miles, with a total population of 7,991,894. The returns state the area and population of the various possessions as follows:—

Colonial Possessions.	Area. English square miles.
Possessions in America—	
Cuba,	43,220
Porto Rico,	3,550
Total, America,	46,770
Possessions in Asia—	
Philippine Islands,	114,326
Sooloo Islands,	950
Caroline Islands and Palaos,	560
Marian Islands,	420
Total, Asia,	116,256
Possessions in Africa—	
Fernando Po, Annabon, Corisco, Elobey, San Juan,	850
Total Possessions,	163,876

The sovereignty of Spain over the Caroline Islands was formally decided by the Pope in 1885, and admitted by Germany and Great Britain. Spain also claims the West Coast of Africa, between Capes Bojador and Blanco, the district of Ifni, near Cape Nun, opposite the Canary Islands, the islands of Elobey on the west coast of Africa, and the country on the banks of the rivers Muni and Naya. The extent of the Sooloo Archipelago under Spanish protection is defined in a protocol signed at Madrid on 7th March, 1885, by representatives of Great Britain, Germany, and Spain, as including all the islands lying between the western extremity of the island of Mindanao on the one side and the islands of Borneo and Aragua on the other, excluding all parts of Borneo and the islands within a zone of 3 maritime leagues of the coast.

Coast and Islands.—The coast line, without taking into account the numerous small inlets, is 1870 miles, of which 602 are washed by the Atlantic and 768 by the Mediterranean. The northern coast, from the boundary of France to Cape Ortegal, runs nearly in a continuous line, with few considerable breaks. Most of the indentations are narrow inlets of no great length, and only used by small coasters. These inlets are called *rias*, as they generally constitute the mouths of small rivers. The whole line is rocky, the rocks nearly always approaching the sea, and forming a mural line varying in height from 30 to 300 feet. From Cape Ortegal to the mouth of the Minho the coast, though rocky, is less elevated, and presents numerous headlands and indentations, of which the most remarkable is the Bay of Betanzos, which divides into three inlets, and forms the harbours of Ferrol, Betanzos, and La Coruña. South of Cape Finisterre are four rather large bays, called Ría de Muros y Noya, Ría de Arosa, Ría de Pontevedra, and Ría de Vigo, all of which are deep and have good anchorage. Along this line of coast there are several small rocky islands.

The coast line of the Atlantic, between the mouth of the Guadiana and the Strait of Gibraltar, is of a different character; it is almost wholly low and sandy, and in many parts swampy. That of the Mediterranean from the Strait of Gibraltar to Cabo de Palos is in general elevated and rocky, but has no indentations, and no harbour which vessels of moderate size can enter, with the exception of those of Cartagena and Málaga. At Cabo de Palos a low and sandy coast begins, which extends as far north as Cabo de Santa Pola, a short distance south of Alicante. It has no harbours even for small vessels or large boats, though it is intersected by several creeks, which in some places form small lagoons. The nature of the coast between Cabo de Santa Pola and the mouth of the Ebro varies considerably, but is for the most part low. From the Ebro to the boundary of France it is alternately high and low, and both the low and the high shores generally continue for many miles together; in this part occur the two large harbours of Barcelona and Rosas. A short distance from the eastern coast lie the BALEARIC ISLANDS.

Surface and Mountains.—Spain presents greater and more marked differences in the form of its surface than any other country of Europe of equal extent. The Pyrenees, crowned with snow, form a well-defined border from France. They intersect the connecting isthmus from the Gulf of Lyons to the Bay of Biscay, and the highlands are thence continued by the lower range of the Asturias through the whole north of Spain to its western extremity, the bluff headland of Cape Finisterre. The frontier mountains are the most precipitous and the grandest on the Spanish side, which includes also the highest point, the Pic de Nethou, rising to the elevation of 11,426 feet, first scaled by a Russian officer, with a French companion and guides, in 1842. The peak is an eastern summit of Mont Maladetta, or the "Accursed," perhaps so called from its dreary nakedness, as if "the ghost of some mountain belonging to a departed world." This aspect is all the more striking as the Pyrenees are remarkable for vast forests of pine, oak, and beech, while the lower slopes and floors of the valleys are carpeted with the greenest grass. The chain is from 40 to 60 miles broad, and is cut at great heights by passes, locally styled *puertos*, ports or gates, which serve as lines of communication. They are commonly mere gaps, only a few feet wide, through which the wind rushes with great power, howling dismally. Of the Port de Venasque, a thoroughfare from the Spanish town of that name, it is proverbially said that in it "a father will not look back at his son, nor a son wait for his father." Another notch near Mont Perdu, called the Brèche de Roland, bears the name of the brave Paladin of Charlemagne, who is traditionally said to have cut it with

his sword, and was himself cut off by the mountaineers in that of Roncesvaux. Most of the passes are practicable on horseback, and two for carriages are respectively at the eastern and western extremities. Hannibal and Cæsar led armies across the Pyrenees in ancient times; Charlemagne and Edward the Black Prince in the mediæval; Napoleon and Wellington in the modern age.

The central region of the country is an extensive table-land or plateau, with a mean altitude of 2000 feet, which descends abruptly towards the Mediterranean, but has a long gradual slope westward towards Portugal and the Atlantic, in which direction most of the rivers travel. The plateau is bounded on the north by the Asturian prolongation of the Pyrenees, traversed centrally from east to west in a deviating manner by the Sierra de Guadarama and the Sierra de Toledo, and walled on the south by the SIERRA MORENA. This last ridge overlooks the valley of the Guadalquivir, beyond which rises the SIERRA NEVADA, with the silvery head of the Cerro de Mulhacen on the north-east of Granada, far above the snow-line, the culminating point of Spain. In the nomenclature of the mountains their respective forms are referred to—*sierra* denoting a saw-like or serrated range, *pic* a pointed height, and *cerro* a hog-backed hill. The high plains between the central ridges are generally treeless, arid, and dreary, to which the name of *despoblado* or desert is given, and appropriately so, when viewed in contrast with the luxuriant aspect of the lowlands by which the plateau is skirted. Owing to elevation and exposure, they are swept by piercing winds in winter, while scorched by a burning sun in summer; and hence the climate of Madrid, seated on one of them, is said to consist of nine months of winter and three of hell! The *gallego*, a cold wind, nipping and injurious, blows from the north-west, and a hot blast, the *solano* [see Sirocco], from the south-east, exciting fever and producing enervation. Forests appear on the slopes of this high region, in which the cork-tree, the evergreen-oak, the kermes-oak, the sumach-tree, the chestnut, and hazel are conspicuous, while the maritime lowlands on the south and east abound with the choicest vegetable productions, and appear like a garden in perpetual bloom. Here orange-trees flourish 30 feet high, laden with golden fruit; groves of the myrtle, lemon, and mulberry are common; the olive, fig, vine, almond, and sugar-cane are cultivated; extensive rice-grounds appear, and the date-palm indicates a climate of almost tropical heat.

Hydrography.—The country is deficient in its river system, owing to the dryness of the climate on the great central table-land; the rivers formed are not for that reason proportionate to the magnitude of the area. Nor are they available to any considerable extent for the purposes of navigation, suffering from want of water during the summer droughts, while swollen into impetuous torrents by the melting of the snows on the mountain-ranges. The most important are the DOURO, northern; the TAGUS, central; the Guadiana and the Guadalquivir, southern. These have a westerly flow to the Atlantic, but the first two named pass out of the country, and have the lower parts of their course, where their commercial value is the greatest, entirely confined to Portugal. The Guadiana also quits Spain for Portugal, but returns to it again to form the frontier between the two countries at its mouth. In the Spanish part of its course this stream disappears among swamps, and has a subterranean flow of nearly 80 miles, but throws up numerous pools at the surface, called *los ojos* (the eyes) *de la Guadiana*. Among the rivers discharging into the Mediterranean the Ebro is the largest, and one of the most considerable which Europe contributes to its basin. It drains the southern slope of the Pyrenees, and has its source near the crest of the chain. The syllable *guadi*, a component in the names of several Spanish streams, and of other localities, is a corruption of

the Arabic *wady*, a river or river-valley, introduced into the country by the Moors, and adopted from them. It appears in Guadiana, the River Ana, and in Guadalquivir, an altered form of *Wady-al-Kebir*, "the great river," as the stream would seem to the Africans when compared with the scant water-courses of their native land. The Spaniards took the word with them to the New World, where it figures in the names of sites in Mexico.

Considering the number and height of the mountain ranges, it is remarkable that Spain does not possess a single mountain lake deserving of notice. Its only expanses of standing water are the lagoons which line part of its south and west coast, and which are not only devoid of beauty, but often poison the air with pestilential vapours.

Climate.—The climate, owing to the physical configuration of the surface, varies greatly in different localities. It is warm on the coasts; the table-lands are exposed to great heat in summer and extreme cold in winter. Many of the mountains rise above the snow line, the limit of which, in the Pyrenees, is 8952 feet; in the Sierra Nevada 11,190 feet. In Madrid, which is situated on table-land, the mean temperature of winter is about 43° , of summer $76^{\circ} 2'$, and of the whole year $58^{\circ} 2'$. The cold in winter in the capital has, however, been known to be so severe as to freeze sentinels to death. On the table-land in summer the sky is generally clear and cloudless, and rain seldom falls, but in winter it both rains and snows frequently. Owing to these variations in the temperature, which sometimes take place very suddenly, the climate of the central plateau is far from healthy. The annual fall of rain on the Sierra Nevada and on the north and west coasts is from 25 to 35 inches, while on the table-land of Castile it is only 10 inches, and the capital is often exposed to severe drought. Winter is the rainy season. Snow is confined chiefly to the more mountainous districts. Storms are not frequent, but shocks of earthquake are often felt, and many attended with fearful disasters are on record.

General Aspect of the Country.—To a traveller entering from Bayonne, in France, and crossing the great corn-growing plains of Castile to Madrid, the early portion of the journey through the green valleys of the Pyrenees is picturesque. The Basque provinces are the best in Spain: the inhabitants are a fine, well-grown, hardy class; the villages are better than most others in the country, and if they are dirty and ruined are at any rate picturesque. But on entering the plains of Old Castile a picture of sterility and desolation meets his eyes such as he can scarcely contemplate without a shudder. On every side stretch wide, apparently barren, plains, without a sign of life or vegetation. Here and there appear mud villages, dirty and ruined, the very picture of desolation, so nearly the colour of the surrounding level that were it not for the tall tower of the massive church round which they cluster, they would be scarcely distinguishable. Of all the ancient kingdoms of Spain probably those of Old and New Castile and Leon are the most desolate and barren, and yet these kingdoms are the heart and centre of the empire, which first took its rise from them; it is their arms that are carried as the emblem of the whole nation; they give the name to the national language; and Castilian pride and Castilian honour have become words to represent the national pride and the national honour.

If he extends his journey to Valencia, Murcia, or Granada he finds a change in the scene. The plain of Valencia is a wonder of fertility and cultivation. Groves of oranges everywhere abound; on every side run the little streams to which the land owes all its fertility; every inch of ground appears to be occupied and cultivated with a care and trouble which nothing could excel. On every side of him rise neat little cottages, carefully whitewashed, scattered about through the fields; stately groups of palms rise here

and there in clusters, or singly, giving an almost Eastern aspect to the country, while rows of mulberry trees, immense aloes and cactus, and long squares of waving rice, with their wonderful fresh green appearance, all combine to render it what is called *La Huerta de Valencia* ("the Garden of Valencia").

But the true Spain of the present day is to be found in Andalusia. Instead of the mud-coloured villages of Castile we find whitewashed towns and paved streets. The people also are a finer race—tall, handsome, and well-grown, and look exceedingly well when, in their picturesque costume, they congregate in the squares of their little towns to show off their finery and smoke their paper cigars. Andalusia, however, is no exception to much of the rest of Spain as regards its general appearance. In some places large plantations of the olives for which it is famous give a sombre kind of greenness to the landscape; but with this exception the whole country looks bare, sterile, and repulsive. The glorious sunshine and wonderfully clear air, however, bathe the distant mountains in an indefinitely beautiful soft haze, and lend a charm to even their scarred and arid slopes. The destruction of the trees has no doubt tended to produce the land of the present day, which has well earned the sobriquet of "tawny Spain." The people have never availed themselves of the coal mines with which their country is amply furnished, and consequently the only fuel they possess is wood; and the denudation of the country has been the rule for centuries, and is still progressing in all its vigour. Forests and brushwood alike disappear before the inevitable axe, until, as often occurs in Castile, the traveller may look for leagues over the country without seeing a tree or bush to break its uniformity, and the inhabitants are often obliged to have recourse for their household purposes to fires of chopped straw.

Catalonia is perhaps the most agreeable province of Spain. Some portions of it are exceedingly picturesque and beautiful. Placed under the southern slope of the highest portions of the Pyrenees, the almost perpetual snows of their summits tend not only to temper the excessive heat in summer, but furnish an unceasing supply of water to the rivers. The people are perhaps the most advanced in Spain—active, energetic, and enterprising. Wherever possible they have used the streams to enrich and fertilize the land. Here one sees busy factories and an active, swarming population, and feels that he has once again reached the outward circle of progressive civilization.

Of the remaining old kingdoms of Spain Aragon and Navarre most resemble Old Castile in their general features. Murcia suffers under the scourge of the country, excessive drought: occasions have been known in some portions of the province during which no rain has fallen for two years. But about the city of Murcia itself, and at Orihuela, this general barrenness suddenly changes into the most wonderful fertility. Here, as well as at Granada, the legacy left by the enterprising Moors, during their possession of the country, still bears fruit. In Murcia the river Segura, and in Granada the rivers Genil and Darro, carefully guided and trained, spread over the country in thousands of little channels, and the barren wilderness blossoms like a rose. Almost every kind of fruit can be produced to perfection.

Galicia, from its proximity to the Atlantic, is much more favoured in its climate than the other provinces. It is extremely fertile and well populated; comfortable little homesteads dot the country, pastures and cattle abound, and its entire aspect is cheering and pleasant. The people are frugal and industrious, large numbers of them annually go off to the interior to perform all the hard work which the Castilian is too proud or lazy to do. They are the hewers of wood and drawers of water for the rest of Spain. After years of hard labour they return to their own beloved mountains to enjoy the fruits of their toil.

The lazy Castilian looks down with scorn on the man who, by honest toil, endeavours to raise himself from poverty. "Gallego" is used as a word of contempt; and to call a Castilian by this name is considered a gross insult.

Estremadura, once so rich and fertile, is now almost depopulated and abandoned. Down its splendid valleys run the Tagus and Guediana uselessly to the sea. These plains, that might rival Murcia and Valencia in fertility, now barely yield one wretched crop in two or three years. The population, sparse and steeped in poverty and wretchedness, are not sufficiently numerous for the cultivation of the ground. In natural advantages perhaps one of the finest provinces, Estremadura is at this day one of the poorest.

Productions.—The kinds of grain most commonly cultivated are wheat, maize, barley, and rice. The Castilian wheat is among the finest in the world, but partly from the difficulties of transport, and partly from bad agriculture and other causes, it cannot be produced and exported at a price to enable it to compete with other nations. Other objects of agriculture are hemp and flax, especially in the basin of the Ebro, and madder and saffron on the table-land of Cuenca. In the southern districts the sugarcane and cotton are cultivated, but only to a very small extent. The most common vegetables are onions, garlic, pumpkins, cucumbers, melons, water-melons, potatoes, beans, and pease. Many fruit-trees flourish, including almonds, figs, pomegranates, lemons, oranges, pistachia nuts, raisins, carobas, dates in the southern districts, walnuts, hazel-nuts, and chestnuts. Plantations of the latter, in some of the northern districts, cover large tracts. Olive trees occur in all parts, except the northern mountain tracts, and the vineyards are extensive in nearly all but the most elevated regions. Spain, in fact, produces in abundance wines of every description. The climate and soil are so varied that any desired quality of grape may be produced, but the ravages of the phylloxera, the interference of labour societies, the low prices, and other causes have greatly affected the cultivation of the vine. Attempts have been made to produce wine from oranges. Among the wild trees are the sweet-acorn oak, the cork-tree, the kermes oak, and the sumach-tree. The liquorice plant is abundant in the vicinity of Seville and near the mouth of the Ebro, and the prepared juice is sent to all parts of Europe. There is an extensive trade in esparto grass, which grows abundantly and is used for the manufacture of paper and other purposes. In most parts of Spain agriculture is still in a very backward state, but many improvements have been made in recent years.

Animals.—Among the domestic animals the sheep and horses are distinguished. The former, known as the *Merinos*, are noted for their fine wool, which forms an important article of export. Although many of these sheep have been smuggled out of the country at different times, their exportation has always been prohibited, and their pasturage is regulated by ancient laws. The horses of Spain, and especially those of Andalusia, are remarkable for their beauty—the Arabs, when in possession of the country, having stocked it with their finest breeds. Both the mules and asses are distinguished by their size and beauty. Cattle are only numerous and of large size near the higher mountain ranges. Pigs and goats are bred in large numbers. There are wild cattle in the mountain region of Sierra Nevada, chamois in the Pyrenees, and porcupines in many places. The mountains also contain wolves, bears, lynxes, wild cats, and martens, the last especially in Biscay. The bears and wolves are, however, rapidly diminishing in numbers from the exterminating war waged against them by hunters and the peasantry. Chameleons are found near Cadiz, and monkeys on the rock of Gibraltar. In no country of Europe, except Italy,

is so much silk obtained as in the eastern and southern provinces of Spain. The cochineal insect is reared in Andalusia, Granada, and Estremadura, and thrives well. Bees are very abundant, and much honey and wax are obtained. Only a few kinds of fish are met with in the rivers, but the fishery in the Atlantic is important.

Minerals.—Spain is perhaps the richest mineral country in Europe: mines of every kind underlie her soil. The districts of Granada and Murcia abound in lead and silver; Almeria and Guadalajara in silver (so abundant was silver in ancient times that some of the commonest utensils of the inhabitants were composed of it); Huelva, Murcia, and Badajoz in copper and manganese; Oviedo and Ciudad Real in quicksilver; and iron is found all over Spain, but chiefly in the Pyrenees and Asturian Mountains. Coal also abounds in several scattered districts, chiefly in the Asturian Mountains on both their slopes, in the Pyrenees proper, in the Sierra Morena, and in Cuenca; but as yet it is very little worked, the foreign imports being more than the home produce. Some of the richest mines in the country are in the hands of the government, and are sparingly worked. A railway has been made from the mines to the port of Huelva, and a great impetus has thus been given to the extraction of the ore in that district. Galicia contains numerous deposits of tin, some of which were formerly worked by the Romans. As before stated, iron occurs plentifully, and is, as a rule, of very good quality. Soda is made in many places from marine plants. In some parts large quantities of saltpetre are collected. Many kinds of marble are procured in Catalonia. Several precious stones are found, such as rubies, topazes, amethysts, turquoises, and garnets. Salt is found near Cardona in Catalonia, and is also procured from the lagoon called the Albufera de Valencia, and from the sea-water along the coast between Cape Trafalgar and the boundary of Portugal.

The first exception to Spanish trade exclusiveness was made in 1873, when the great copper mines of Rio Tinto, in the province of Huelva, were allowed to be worked by an association of British and German capitalists. The state of mining enterprise in this very civilized part of Europe may be gathered from the fact that at the time of the concession even a wheelbarrow was unknown here, although these were among the largest copper mines in the world. The work was done by men with hand-baskets, and the minerals transported on the backs of donkeys. All modern appliances have now been introduced.

Trade and Commerce.—In the middle ages the manufactures of Spain, especially along the coast of the Mediterranean, were in a flourishing condition, and found an extensive demand, particularly in the Levant and other parts of the East. With the expulsion of the Moors, the branches which they had specially fostered fell rapidly into decay, and have never been revived. New demands, however, arose in the West, and Spain, as the mother country, reserving to herself the sole supply of the colonies, was able, for that purpose alone, to carry on a number of lucrative manufactures. The loss of her colonies putting a sudden stop to the demand, was followed by the almost total extinction of her manufactures. In modern times, with a settled government there has been an improvement in this respect, and within the last forty years the value of Spain's foreign commerce has risen from £8,000,000 to over £60,000,000 per annum. The Revolution of 1868 cost the country very dearly, but it had the salutary effect of sweeping away abuses which retarded the national growth, fettered the progress of popular enlightenment, and kept Spain aloof from other European states. Still, as compared with her neighbours, she is out-distanced in the race of progress.

Silk and cotton goods are manufactured to some extent in Catalonia, particularly in Barcelona; flannels,

blankets, woollens, and velvets, in Manresa, Tarraza, Guadalajara, and different towns of Valencia and Aragon; leather in Valladolid and several towns of Andalusia; wax-cloths in Barcelona; linen, both ordinary and damask, in Galicia; sailcloth at Coruña and Cartagena; stained paper, jewelry, and porcelain at Madrid; ironware, chiefly of the larger and coarser descriptions for common and sword cutlery, in the Basque provinces, Mondragon, Toledo, Albacete, Guadix, &c.; common earthen and delft ware, in Andujar, Alcora, Caceres, &c.; enamelled tiles in Valencia; paper in Valencia and Catalonia; and tobacco in various towns, but more especially in Malaga and Seville.

The principal articles exported from Spain are—wine, minerals (such as quicksilver, copper, lead, tin, &c.), dried and green fruits, wool, cork, and oil. The total annual value of the exports of all kinds is about £28,000,000. The value of the imports into the country is in excess of that of the exports—amounting to £33,000,000 per annum. France heads the list of foreign countries trading with Spain, the exports thereto being valued at more than £10,000,000 per annum and the imports at £7,500,000. Next comes the United Kingdom (including Gibraltar), with exports and imports each valued at about £7,000,000 per annum; and then Germany, with £3,500,000 imports and £300,000 exports. The German commercial traveller is indefatigable throughout the Peninsula, and being well backed and supported makes considerable headway against his English and French rivals. Numbers of young men destined for business careers are sent to Spain and placed in Spanish houses to learn the language and to study the tastes of the people—a task of easy accomplishment, attainable with an ordinary share of intelligence within a twelve-month. It stands to reason that a commercial traveller or agent enjoying these advantages is more than a match for one who can only recommend his wares through the medium of an interpreter or by the mere exposure of his price list. At Malaga there is quite a German colony of young business men, who, after a year or two's residence there, return home well prepared for entering into the employ of firms having commercial relations with Spain.

The principal ports of Spain are Barcelona, Cadiz, Santander, Alicante, Malaga, Valencia, Bilbao, Cartagena, San Sebastian, and Tarragona. The merchant navy is advancing in numbers; while something is being done towards the improvement of the harbours. The total tonnage which annually clears from the ports of Spain is over 8,500,000 tons.

The principal article of import into the United Kingdom is wine. The other articles of importance are olive oil, lead, raisins, vegetable fibre for making paper, oranges and lemons, nuts, oxen, copper, quicksilver, manganese ore, wheat, silver, copper ore, iron ore, pyrites, cork, eggs, almonds, figs, and grapes. The chief exports of the United Kingdom to Spain are linen yarn, linen manufactures, raw cotton, iron manufactures, coal, woollens, cotton goods, steam-engines, other sorts of machinery, tin plates, apparel, alkali and copper manufactures, drugs, fish, silk manufactures, cinnamon, cocoa, and tobacco.

No country of Europe equals Spain in natural commercial advantages, whether we consider its situation or its products. The coasts are extensive and well lighted, and the ports numerous; the inhabitants, inured to a warm climate, visit the tropical regions with comparative safety, yet it is far behind most other European nations in commercial importance. In 1886, a treaty was concluded with England, by which British goods were placed on the same footing as those of other countries, and the English alcohol duties were made more favourable to Spain.

Internal Communication.—Great efforts have been made to improve internal communication, and the roads now constructed are excellent, and will bear comparison with any in Europe. The railway system has received an ex-

pansion quite out of proportion to the existing state of the country—there being now nearly 5500 miles in operation. The railway system centres at Madrid, from which four great lines radiate in as many directions, connecting the capital with all the most important towns in the kingdom. Spanish railways have been chiefly built with French and Belgian capital, though some few lines have fallen to England's share, and they are notably the best constructed railways in the country. From the first it has been the habit of the government to grant subventions to companies which have received their concessions, and formerly as much as one-half the cost of construction was furnished in this manner. Now, however, it is prescribed by the Railway Subvention Statute that these grants shall not exceed 25 per cent. of the approved cost. Upwards of £25,000,000 have been paid by the government in bonds and cash in subventions. The Spanish railways are, as a rule, badly managed, and the rate of speed very slow.

There are several canals in Spain, many of them on a magnificent scale, but mostly unfinished and unfit for navigation. The chief is the Imperial Canal, commenced by Charles V., along the right bank of the Ebro.

Government, Constitution, Law, &c.—The government of Spain during the early part of the middle ages was absolute, but the power of the king, after 1169, when the first Cortes was held at Burgos, was more restricted than in any other country of Europe. Ferdinand the Catholic aimed the first blow at Spanish liberty, by avoiding as much as possible the convocation of the Cortes. His successor, Charles V., completed its ruin by defeating the citizens who rose in arms to support the cause of national liberty. Spain continued to be ruled despotically by the kings of the houses of Austria and Bourbon until the French invasion in 1808, when the deputies of the several provinces assembled at Cadiz, and framed a new constitution, which was sworn to and promulgated in 1812. At the close of the war, however, Ferdinand VII., who had recovered his liberty, refused to give it his sanction, and re-established the old form of government; but being compelled soon after (1820) by a military insurrection to swear to the constitution of 1812, it again became the law of the land, until it was a second time put down with the assistance of a French army.

On the death of Ferdinand (1832), his widow, Queen Christina, wishing to conciliate the Liberal party, gave the nation a new charter (*Estatuto Real*), and re-established the ancient Cortes of the kingdom with some slight modifications. After various minor changes, a new constitution was established in 1837, based on the charter of 1812. It was slightly modified in 1845, partly suspended in 1857, but re-established in 1864. Frequent disregard of its provisions caused the revolution of 1868, and the establishment of a new dynasty in 1870. The new king, Amadeus, abdicated in 1873, and the republic was adopted by a large majority of the Cortes. This, under the presidency of Marshal Serrano, existed to the end of 1874, when Alfonso, the son of Queen Isabella, was called to the throne, which he assumed early in 1875. Some colour of permanence was given to the new government by the fact that in 1876 Isabella herself was permitted to return to the country. The constitution in vogue dates from 1876, and is founded on that of 1869. It asserts that all powers emanate from the nation, and that the making of laws resides in the Cortes alone. The form of government provided for is monarchical, but little more power is given to the king than to sanction and promulgate the laws. The executive resides in him, but he must exercise it by means of his ministers. The Cortes are composed of two bodies—the Senate and the Congress—both equal in faculties. A fourth of the former are elected every three years; the latter are totally renewed every three years. The Cortes meet at the latest by the first of

February in each year, and the session must last at least four months. It belongs to the king to convoke, suspend, close, or dissolve them. He can, however, only suspend them once in the season, and in event of dissolution he must convoke new Cortes within three months. Each of the two bodies forms its own internal rules, and elects its president, vice-presidents, and secretaries. The two bodies can never deliberate jointly, or when the king is present. Their sessions are public, except on economic matters or cases necessitating urgent secrecy. Projects of law must be voted in both by plurality of votes, but at least half plus one of the members must be present. Petitions cannot be presented to the Cortes in person, neither can open-air meetings be held in the neighbourhood of the legislative buildings. Inviolability of the persons of senators and deputies is guaranteed. The mode of electing representatives of the Senate and Congress is by universal suffrage. The person of the king is inviolable, and the ministers are responsible. The king appoints and dismisses them freely. The power to execute the laws resides in the king, and his authority extends to the conservation of the internal public order or external security. The king disposes of the forces of sea and land, declares war, makes and ratifies peace, afterwards presenting to the Cortes documentary accounts of the same. Everything the king commands in the exercise of his authority is to be signed by the minister to whom it corresponds, and without such signature no public functionary is to respect it. The ministers are responsible to the Cortes for any wrong acts they may commit in the exercise of their functions. To the Congress it belongs to accuse them, and to the Senate to judge them.

The new constitution also established tribunals of justice and trial by jury. The judges and magistrates are personally responsible for any infractions of the law they commit, and any Spaniard can enter public action against them. The government present to the Cortes every year, within ten days of their opening, the estimates of expenses and revenue. No payments are made except duly authorized by law, and the same is required before the government can dispose of any of the public property, or raise money on the credit of the nation. The Cortes determine every year the number of the land and sea forces. No armed forces of any kind permanently exist in Spain unless authorized by a law, and citizens and foreigners possess the rights usual in constitutional countries.

Church and Education.—The national church of Spain is the Roman Catholic, and the whole population of the kingdom, with the exception of about 85,000 persons, belong to it. According to article 12 of the Constitution of 1876, a restricted liberty of worship is allowed to Protestants, but it has to be entirely in private, all public announcements of the same being strictly forbidden. The constitution likewise enacts that "the nation binds itself to maintain the worship and ministers of the Roman Catholic religion." Resolutions of former legislative bodies, not repealed in the constitution of 1876, settled that the clergy of the Established Church are to be maintained by the state. On the other hand, by two decrees of the Cortes, passed 28th July, 1885, and 9th March, 1886, all conventual establishments were suppressed, and their property confiscated for the benefit of the nation. These decrees gave rise to a long dispute with the head of the Roman Catholic Church, which ended in the sovereign pontiff conceding the principle of the measure. By a concordat with Rome, concluded in August, 1859, the Spanish government was authorized to sell the whole ecclesiastical property, except churches and parsonages, in return for an equal amount of untransferable public debt certificates, bearing interest at the rate of 8 per cent.

Up to a very recent period, the great mass of the population of Spain was in a state of extreme ignorance, and

even yet education is far from being generally diffused. It was rare, in the latter part of the eighteenth century, and at the beginning of the present, to find a peasant or an ordinary workman who was able to read, which accomplishment among women was even held to be immoral. Great exertions on the part of successive governments have been made during the last quarter of a century to effect such reform in popular instruction as was demanded by modern changes and advance in social institutions, in order to bring within the reach of the middle and lower classes gratuitous teaching of a practical and useful description.

The frequent changes in the opinions of the various governments have not been favourable to progress. At present a liberal policy is uppermost, the masters are left free to choose what text-books they please, and anyone is free to establish a school; the most successful attempt which has yet been made to escape from the rigid form of the state educational system, and to teach on a liberal and independent plan, has been in the establishment of the Free Institute at Madrid. The general system upon which this institute is based is completely novel. Besides receiving a general state education, with a view to obtaining the degree of bachelor by examination at a public institute, the boys are instructed in music, the fine arts, gymnastics, carpentering, and other accomplishments. They are encouraged to devote some of their spare time to athletic games, and great care is spent on such details as cleanliness, neatness in dress, and orderly behaviour—points which at the public schools of Spain are completely neglected. The pupils are taught in small classes, and associate on terms of intimacy and friendship with the masters. Each boy is taken once or twice a week to visit one of the museums, factories, workshops, courts of law, or public departments of the government at Madrid. Holidays in term time are devoted to expeditions to points of scientific or historical interest within easy reach of the capital, and the regular holidays in the summer months are spent in similar expeditions, not unlike "reading parties," to remote parts of Spain. The extra expenditure on this account is met by donations, the boys themselves paying as far as they are able. Such expeditions are carefully mapped out and prepared for by a special course of study beforehand, with a view to the composition of detailed essays by the boys on their return to school. Though state education is free, a very small sum figures in the budget to the account of education, and nearly 60 per cent. of the population are said to be unable to read. It is hoped, however, that a decree of 1882, providing for the regular payment of their salaries to masters by the municipalities will remove the main obstacle to efficient elementary instruction. Spain is divided, for educational purposes, into the following university districts:—Madrid, Barcelona, Valencia, Seville, Granada, Valladolid, Santiago, Saragossa, Salamanca, and Oviedo; and the rectors of these ten universities are the connecting links between the educational systems of their respective districts and the central government of Madrid. The primary schools are placed under the special charge of the municipalities, every town of 500 inhabitants being obliged to maintain at least one, and every town of 2000 inhabitants at least two such schools, besides an equal number of schools for girls. An additional primary school, private or public, is imposed by law for every additional 2000 inhabitants. Villages of less than 500 souls combine to form school districts. According to the law of 1857, the central government at Madrid is bound to assist the most poverty-stricken municipalities with an annual contribution of at least £10,000 to be spent in school buildings. The course of instruction in the primary schools is intended as a preparation for the "Institutos," or secondary schools. There must be at least one public school of this class in every province, whatever may be the number of private establishments. The ex-

pense is borne by the provinces, except in the case of Madrid, where there are two institutos, supported by the central government. The fees paid by the students are sufficient to cover the greater part of the cost of these establishments, for the number of students is very high, several thousands of names being included on the lists of the larger institutos. Schools of this class are indeed more like universities in their organization and management.

Condition of the Industrial Classes.—Catalonia and Valencia are the two most important provinces, and Valencia, Alicante, and Barcelona the chief seats of industrial activity. Spain enjoys every variety of climate, from excessive cold to African heat, and where the latter prevails, the same indisposition to physical exertion prevails which is observed in hot countries. Saints' days and trade societies, as carried on, materially hinder the adequate development of manufacturing industries. The ordinary food is dried tunny or other fish, capsciums, oil, bread, fruit, and red wine, for breakfast; a thick soup, made with rice, beans, garlic, olives, pulse, potatoes, or bread, for dinner. The poorer classes often eat "gaspacho," a cold soup made of slices of bread in vinegar, oil, and water, flavoured with garlic; the red wine of the country is good and cheap, flesh meat and spirits are rarely consumed, and the working people as a rule are well knit, strong, and enjoy excellent health. Their clothing is good and sufficient, that of the peasantry, especially on fête days, handsome and picturesque.

Army and Navy.—The army of Spain was reorganized in 1868, after the model of that of France, and by subsequent laws in 1877, 1878, 1882, and 1883. Under the new military law, the armed forces of the kingdom consist of—1, a permanent army; 2, a first or active reserve; 3, a second or secondary reserve. All Spaniards past the age of twenty are liable to be drawn for the permanent army, in which they have to serve three years; they then pass for three years into the first or active reserve, and for six years into the second reserve. By a payment of about £60 anyone may purchase exemption from service. For the colonial army the total period of service is eight years, four with the colours and four in the second reserve. By increasing the number of depot battalions, assigning to each reserve battalion a special district, and making it the essential basis of regimental organization, both for recruits and for the reserves, it is hoped that in time Spain may be able easily to mobilize in case of necessity an army of 400,000 men. The strength of the permanent army of the Peninsula in 1887 was 93,000 men, and 13,000 officers. For military purposes the kingdom, with the islands, is divided into fourteen districts or "capitanías generales," at the head of each of which stands a "captain-general."

The navy consisted in 1887 of—First class, four ironclad frigates, 55 guns; one armour-clad, building in France; four screw frigates, 97 guns; six cruisers, 48 guns. Second class, four screw frigates and one paddle frigate, 104 guns; eight cruisers (five building), 21 guns; four paddle and six screw corvettes, 32 guns; two troopships, 7 guns. Third class, one ironclad monitor, 3 guns; one floating battery; two transports, 4 guns; seventy screw gunboats, 165 guns; five paddle gunboats, 9 guns; and two despatch vessels, 6 guns. There are besides seven torpedo boats and one torpedo vessel, and three torpedo boats building, beside various tugs, depot and school ships, and small craft. For the defence of the colonies, and mainly of Cuba and Porto Rico, Spain maintains a small fleet of gunboats, thirty-five in number, all of the same size, 107 feet long, 22½ feet beam, 8 feet depth of hold, and drawing about 5 feet water. They are screw steamers, and each one carries a 100-pounder pivot gun at the bow. Many of these are said to be unfit for service. The navy of Spain is manned by 14,000 sailors and 7033 marines, and commanded by one admiral, twenty vice and rear admirals,

and 650 commissioned officers of various grades. The navy, like the army, is recruited by conscription, naval districts for this purpose being formed along the coast among the seafaring population.

Finance.—The finances of Spain have ever been, and still are, one of the greatest stumbling-blocks of her progress in the path of civilization. When she was mistress of the world, and had in her possession the wealthiest mines, she was poor and embarrassed, and the slave of expediency. The revenue of the country has much increased of late years, but the expenditure has been raised in an even greater degree. In 1822, when the great English loans were made to Spain, the total revenue of the country was only about £6,000,000 sterling. In 1850 the revenue actually realized was £12,720,000; in 1855, £15,000,000; in 1860, £19,000,000; and in 1867, £22,000,000. The latter sum, however, included £4,500,000 derived from recent sales of national property as "extraordinary" revenue.

The national and church property was, and is still, of immense value, but there was a reluctance in some people to buy the latter on account of religious scruples, till 1858, when a concordat was concluded with the Pope, and sanction obtained for the sales, which were then actively continued, the government giving great facilities to the purchasers. The payments were to have been made one-tenth in cash, and the remainder in promissory notes from one to ten, and even nineteen, years. As a matter of fact, payment has generally been made in debt certificates, and the idea of any value attaching to these is truly a "hope deferred."

It is extremely difficult to obtain any reliable idea of the revenue and expenditure; but it is well known that the estimates of Spanish finance ministers have rarely, if ever, been justified by actual receipts of revenue, and this in spite of the undoubted fact that the national income has shown an elasticity and capacity of growth which countries enjoying untroubled peace and equable prosperity might envy. The revenue, indeed, which, as we have already observed, was only £15,000,000 in 1855, had risen in 1867 to £22,195,000. Then came the revolution, the struggles for the establishment of the republic, the civil war, and of course the progress of growth was checked. In 1885-86 the budget estimate of income was £34,589,272, and expenditure £35,885,875.

It was admitted by successive ministers of finance in recent years that Spain was absolutely unable to pay interest on its debt in the existing state of things, ruined both by a costly and wasteful civil war, and desperate and equally costly efforts to suppress the insurrection in Cuba. In a report of the government of the King Alfonso XII., dated July, 1875, it was stated that not any of the national creditors could hope to be satisfied without having recourse to credit operations at an enormous rate of interest, which in a short time doubles the original debt. It was arranged in 1881-82 that the bulk of the Spanish debt should be converted into a new series of 4 per cent. The external debt was thus reduced (1884) to a capital of £77,193,596 at 4 per cent.; the redeemable internal debt reduced to a capital of £72,000,000 new internal 4 per cent.; and the perpetual internal to a capital of £77,749,600, also at 4 per cent. There are besides £3,598,475 at 2 per cent.; £2,818,100 5 per cent. quicksilver bonds; the 5 per cent. consolidated due to the United States, £120,000; the 3 per cent. due to Denmark, £120,000; and the 3 per cent. securities and guarantees. The total capital of the debt was thus reduced to £288,099,771. In the budget of 1885-86 the total charge of the debt was £10,988,510, or nearly one-third of the total expenditure.

Races, Character, Customs, and General Description of the People.—The inhabitants of Spain consist chiefly of Spaniards proper, composed of a mixture of ancient abori-

gines, Romans, Visigoths, Vandals, and Suevi, but there are also in the country three other distinct races—Basques, occupying the province of that name, forming about one twenty-fourth of the whole population; Modejars, a remnant of the Moors who, in the general expulsion of their countrymen, found refuge in several valleys in the kingdom of Granada and the Castiles, and whose descendants, unmingled with the other inhabitants, are still living there, to the number of about 60,000; and Gitanos or Spanish gypsies, who are found diffused over all parts of the peninsula, but do not number above 45,000. The Spaniards proper, to whom only it is necessary here to advert, are of middle stature, well formed, of a sallow hue, sharp features, dark hair, and keen black eyes. The women are generally of middle or low stature, but often gracefully formed, with almost aquiline noses, full, dark eyes, black hair, and complexions varying from the fresh tint of North Europe to the light olive of the Moors.

The habits and customs of the inhabitants vary greatly in different parts. The most ordinary drink of the middle and higher classes at meals, especially breakfast, is chocolate. Wine is consumed in only comparatively small quantities; more is drunk at a German *table d'hôte* in a day than at a Spanish one in a month, and the kinds in general use are seldom much stronger or better than the low-priced wines of France. The favourite dishes consist of mutton and pork—especially the latter—dressed in various ways, and accompanied with cabbage, garbanzos (Spanish beans), onions, and large pease called *chichoros*. The *siesta*, or repose during the heat of the day, is customary with all classes throughout Spain. From one to four o'clock in Madrid and most other large towns the shops are either shut or a curtain drawn before the door; the shutters of every window are closed, and scarcely a respectable person is found on the street. But the moment the *siesta* is over all is again instinct with life and bustle. Exercise is generally taken in the evening, when nearly the entire population is abroad. *Tertulias*, or evening parties, are frequent in the great towns, but except in Andalusia the Spaniards are certainly not an hospitable people. They meet but seldom at each other's houses in comparison with other nations; never take their *puchero* and *garbanzos* together; and no friends, but only the near relations who live in or about one house ever surround the Spanish board. Invitations are given for *tertulias* or evening parties only, and at these the heaviest refreshment is *agua fresca* and a few lumps of sugar; if ices are added the *soirée* may be fairly termed sumptuous. The theatre is comparatively little frequented; but high and low, young and old, male and female, are passionately attached to the bull-fight—a most brutalizing sport derived from the Romans, and one of the darkest spots on the Spanish character. Great effect is given to the spectacle by the gay and gorgeous dresses worn by the parties engaged. Even priests appear as spectators, though not as formerly in full canonicals, but in disguise. Sundays and Mondays are the principal days on which the fights take place.

The handsomest females are to be found on the shores of the Mediterranean and in Andalusia; those of Castile are generally plain; their complexions are bad, and very soon become yellow and dry, to which, perhaps, nothing tends so much as their inordinate use of powder and paint. As the beauty and grace of the Spanish women have been overrated, so doubtless their morality has been unjustly depreciated. It is quite true that immorality is still very general both among the upper and lower classes, and no country in Europe has such a large proportion of foundlings and foundling hospitals. With but very few exceptions the old stamp of Spanish nobles seems to be extinct. Combining a strange medley of character, the Spaniards present the spectacle of a people gifted with some of the finest characteristics of the human race.

History.—There is indisputable evidence that the Spanish peninsula was well known to the much-wandering Phœnicians at least ten centuries before the Christian era. The Tarshish of Scripture, whence minerals were brought in “ships of Tarshish,” referred to a portion of the south coast. Its aboriginal inhabitants appear to have been Celts and Iberians, who were afterwards designated by the common name of Celtiberians. Nothing is known, however, of their earlier annals, and the history of Spain really dates from the establishment of the Carthaginian colony of Barceno (the modern Barcelona), about 300 years before Christ. The Punic traders were attracted thither, like their Phœnician ancestors, by its mines of gold and silver. They exported prodigious quantities, and though the yield was considerably reduced in the time of the Romans, yet even then, in nine years, no less than 111,542 lbs. of silver and 4895 of gold, besides an immense quantity of coin and other valuable articles, rewarded their enterprise.

After the second Punic War the Romans resolved to carry their arms into a country endowed with such natural wealth. The subjugation of Carthage rendered them masters of the Mediterranean, and their fleets easily transported the legions to the Spanish coast. They found the Spaniards no despicable opponents. They succeeded in establishing themselves on the eastern and southern coasts, but as they penetrated inland, were met with a more determined resistance; their enemies were as brave as themselves, animated by a noble love of freedom, and to the military skill of the Romans could oppose as some counterbalance a familiar knowledge of a rugged and difficult country. The Numantines, Cantabrians, and Asturians long maintained their independence. While Rome was engaged in the third Punic War several tribes who had formerly been in alliance with Carthage, united themselves under the command of Viriathus, a hunter, and afterwards a predatory chief, and boldly attacked the Romans in that part of the peninsula which they called Lusitania, now Portugal. They defeated the prætor Vettius with a loss of 4000 men. The Romans sent a second army against them, but Viriathus was again victorious, and actually made himself master of the whole country.

Carthage fell, and Rome immediately addressed herself to the task of recovering her supremacy in the peninsula. She found it a difficult enterprise. At length Scipio Æmilianus, the destroyer of Carthage, was despatched to close the war. He laid siege to the principal stronghold of the revolted tribes, Numantia. After a most desperate resistance it submitted, though scarcely a citizen survived to grace the conqueror's triumph. All Spain acknowledged the Roman rule, and was divided into two great divisions—Bætica or Hispania Ulterior, and Tarraconensis or Hispania Citerior.

The spirit of revolt, however, lay dormant. When Sulla had crushed the party of Marius at Rome, B.C. 81, one of the ablest of the Marian chiefs, SERTORIUS, fled to Spain, where he speedily collected a powerful army, and ultimately nearly the whole of the peninsula was wrested from Rome and acknowledged his chieftainship. Sertorius was treacherously assassinated by one of his officers, B.C. 72. The traitor assumed his victim's place at the head of the insurgent troops; but soon fell before the military capacity of Pompey the Great, and Spain submitted once more to the Roman dominion.

Isolated revolts continued to occur for many years, until the rebellious tribes were literally exterminated by Agrippa. Thenceforward the peninsula showed no signs of independent life. Augustus encouraged the development of its vast resources by many wise measures, and himself founded the colonies of Cesar Augusta (Saragossa), and Augustus Emerita (Merida). It is said that the Spanish provinces at this time possessed a population of 40,000,000; that Tarragona had 2,500,000 inhabitants,

and Merida supported a garrison of 90,000 men. In these statements there is doubtless much exaggeration, but it is certain that Spain prospered largely under the Roman sway, and gave birth to many men of first-rate genius: as Pomponius Mela, Seneca, Lucan, and the emperors Trajan and Theodosius the Great.

This halcyon period came to an end as the fortunes of the imperial city sank into decay. The Gothic tribes of Vandals, Alani, and Suevi poured into the Peninsula. The kingdom of the Visigoths was founded about the year 420. The Vandals, from whom Andalusia received its name, were forced to retire before the great Visigoth conqueror, Wallia. The Romans were compelled to fly by his successor, Euric, in 484; and finally, the unity of the Spanish nation under a Visigoth king was established by Leovigild, who in 583 drove the Suevi from Galicia, and confirmed by the introduction a few years later of the Christian religion, under the auspices of Reccared I.

The *Second Period* of Spanish history may be considered to date from the year 711, which witnessed the overthrow, on the field of Xeres de la Frontera, of Roderic, the last of the Goths, by the Saracen invaders. Nearly the whole of Spain was brought under Moorish dominion by this decisive battle, as well as the outlying Gothic province of Septimania (now Languedoc)—those Goths who still struggled for independence concealing themselves in the highlands of Asturia, Burgos, and Biscay.

The Moors at first regarded Spain as a dependency of their North African province, but eventually administered it by emirs whom the Caliph of Damascus appointed. Pursuing their career of conquest into Gaul, and capturing the Balearic Islands, as well as Sardinia and Corsica, they neglected the rising power of the Asturians, who about 718, under a prince of royal blood, Pelayo or Don Pelagio, succeeded in establishing their virtual independence. The kingdom thus created (that of Leon and Oviedo) was augmented in 758 by the annexation of Galicia; and towards the close of the century by parts of Leon and Castile. In 758 another Christian kingdom was founded in Sobrarbe, including some portions of Aragon and Navarre, and its sovereign, with short-sighted policy, formed an alliance with the Moors, and fought by their side at Roncesvalles against the army of Charlemagne.

Meanwhile, a succession of twenty emirs in about forty years threw Moorish Spain into a condition of miserable anarchy, which continued with little improvement, until, in the middle of the eighth century, Abderrahman, the caliph's viceroy, threw off the yoke, declared himself independent, and founded the caliphate of Cordova, where he built a glorious mosque as a permanent memorial of his genius and his power. For nearly two centuries Cordova remained the capital of the Moorish kingdom and the centre of learning, art, and science.

About 933 a new Christian principality appeared in Spain, that of Castile, which occupied the centre, between the kingdom of Leon and Oviedo, and the Moorish caliphate. From this central position it was well fitted to become the great focus of Christian power. It fell under the sway of the kings of Leon and Oviedo. In 1035 Don Sanchez bestowed it upon his son, Don Ferdinand, with the title of king, who thus, on his father's death, united under one crown Leon and Oviedo and Castile.

Aragon, another Christian state, was carved out of Moorish territory about the beginning of the eleventh century. Its earlier annals are but imperfectly known. About the year 1035, Sancho III., surnamed the Great, king of Navarre, erected it into a kingdom for his son, Don Ramiro, who enlarged it by the districts of Sobrarbe and Ribagorza, and by various conquests from the Moors. It soon became very powerful, and acquiring by marriage the county of Barcelona, reached the sea-coast, and was enabled to extend its arms to Sicily and Naples.

We may now glance at Spain as divided into two unequal parts by a straight line drawn from east to west, from the coasts of Valencia to a point southward of the mouth of the Douro. North of this line the country belonged to the Christians; south of it, to the Moors. The latter, in point of wealth, power, and resources, were greatly superior to the Christians; but they were divided among themselves, and lacked that spirit of enterprise and persistent proselytism which Christianity communicates to its believers, and we find the Christian kings gaining victory after victory over their enemies, until the latter were crushed on the memorable field of Tolosa, 16th July, 1212. In this great battle the Moslems lost 100,000 killed and 50,000 taken prisoners. It completely broke the power of the dynasty of the Almohads, who had succeeded the Almoravids (about 1150), as those had succeeded the original race of caliphs, the Ommiads. The only independent Moorish state now remaining was the kingdom of Granada, founded by Mohammed-ben-Alhama, about 1238; but this, in 1246, was compelled to become tributary to Castile.

The *Third Period* of Spanish history is occupied by the dissensions which broke out between the different Christian princes, after their union had been loosened by the removal of all fear of Moslem oppression. Our limits prevent us from detailing these intestine disturbances, which would neither interest nor inform the reader.

The two leading Christian kingdoms were those of Castile and Aragon. That of Navarre occupied an inferior position. Castile was distracted by the domestic feuds of its princes, of whom the most noteworthy were Ferdinand III., Alfonso X., Alfonso XI., and Queen Isabella. Aragon, undisturbed by internal troubles, thrived rapidly, and under each succeeding monarch enlarged its borders. Jayme I. conquered Valencia and Majorca; Pedro III., Minorca and Ivice and Sicily; Jayme II., Sardinia and Corsica; and Alfonso V., Naples. Thus, as a maritime and commercial power, Aragon was preparing to bind the dislocated provinces and states of Spain into one firmly-welded and compact kingdom.

The chronicles of Navarre must be briefly glanced at, from their connection with European history. From 1284 to 1328 it formed a part of France; and even after the severance of the two crowns a close alliance was maintained between the French and Navarrese royal houses. Charles, surnamed the Wicked, who ascended the throne of Navarre in 1350, espoused the daughter of John of France. He nevertheless entered into a negotiation with England against the French monarch, but being betrayed at Rouen, was thrown into prison, and many of his principal councillors were treacherously executed. His adherents immediately solicited English aid. The Black Prince invaded France, defeated the French at Poitiers, and captured their sovereign. Having thus meddled in Spanish affairs he was induced to lend his support to Peter the Cruel of Aragon, who had been deposed by an intrigue of his brother, Henry of Transtamare; and he defeated the allied forces of Don Henry and the French in 1368. The crown of Navarre, meanwhile, asserted its independence of France. Charles III., surnamed the Noble (1387-1425), restored order to its administration; and his daughter Blanche, marrying John, king of Aragon, the two kingdoms were for some years united. On the death of John, Navarre was again formed into an independent state under his daughter, Eleanor de Foix, and her son, Francis Phoebus, who, in 1483, was succeeded by his daughter Catherine and her husband, John d'Albret. It could not maintain its independence, however, against its powerful neighbour, and all Navarre south of the Pyrenees was conquered and annexed by Ferdinand of Aragon in 1512.

The kingdom of Castile in 1474 was united to that of

Aragon by the marriage of its sovereign, Isabella, to the prudent and politic Ferdinand. Christian Spain being thus united under one sceptre, it was obvious that the solitary Moorish caliphate of Granada must soon fall before its attacks. A crusade against the Moslems was proclaimed by Pope Sixtus IV.; and Ferdinand, as a true son of the church, led his knights against the warriors of the crescent. The gallant struggle which ensued has been celebrated in poetry and prose, in ballad and legend, as well as in sober history. It terminated in 1492, when Granada was captured after a two years' siege, and the Moors finally withdrew from Spain, where their banners had waved for upwards of 800 years.

Fourth Period.—But the fortunes of Spain received a greater stimulus in 1492 than was afforded even by the fall of Islam. In that year, on the 17th of April, Columbus set out in quest of a new world, and opened up to Spanish enterprise the apparently inexhaustible resources of North and South America. Mexico was afterwards subdued by CORTES, and Peru by PIZARRO; and their gold and silver flowed for years into the treasury of the Spanish monarchs, providing them with the means of extending their conquests in Europe, and inciting them to aspire to universal dominion. In the sixteenth century Spain was the foremost European power. Her seamen were the most skilful and adventurous; her soldiers the bravest and best disciplined. Her ports were thronged with richly laden argosies, her flag floated on every known sea. Under the able administration of Cardinal Ximenes her internal peace was secured by many admirable reforms, and the rights of the burgher class asserted against the pretensions of an arrogant nobility. When Charles I. (afterwards the Emperor Charles V.) succeeded Ferdinand on the Spanish throne (1517), he came into possession of an empire which almost equalled that of ancient Rome in extent, and surpassed it in its resources. He inherited not only Spain and Austria, but the Netherlands and Franche Comté, Naples and Sicily; and his election to the imperial crown of Germany in 1519 seemed to raise him to the indisputable position of arbiter and dictator of Europe. The marriage of his son Philip to Queen Mary of England appeared a further consolidation of his power. But Luther preached the Reformation in Germany. English seamen found their way to the rich shores of Peru and Mexico. A spirit of revolt, which the free thought of Protestantism fostered, awoke in the Netherlands. France, alarmed at Spanish preponderance, allied herself with every state that ventured to oppose the great emperor. Great indeed was the contrast between 1520 and 1555. All Europe had changed its aspect, and new principles of policy were regulating states. Protestantism was an established fact, and the treaty of Passau, in 1552, gave liberty and equality to the professors of the new faith. Charles was sagacious though heartless as a ruler, but an unrepentant bigot as an individual man. The necessities of his condition, by which he was forced to give toleration to the enemies of the church, weighed upon his heart. A younger hand and bloodier disposition, he thought, were needed to regain the ground he had been obliged to yield, and in Philip his son he perceived all these requirements fulfilled. In 1556, therefore, he resigned to Philip his title of monarch of Spain and the Indies, with all their dependencies, and the empire to his brother Ferdinand. He then retired to the monastery of St. Just, where in unrestrained gluttony and fanatical absurdities he sought to forget his disappointment, and died, unlamented, in 1558.

The decadence of Spanish power which had begun under Charles made rapid strides under Philip. The latter was nothing if not a bigot; he was incapable of forming or appreciating any great measures of policy, yet his ambition spurred him on to attempt the aggrandizement of his crown. His tyrannies forced the Flemings to revolt, and

in the princes of Orange they found leaders worthy of a gallant people. Encouraged by the sympathy and aid of England, they fought a long, a gallant, and eventually a successful fight for liberty and independence. Bitterly wroth against the English, who so audaciously countenanced his rebellious subjects, and whose sea-rovers were harassing his American colonies, he resolved on crushing them by one supreme blow, and launched against them that splendid failure, the Spanish Armada (1588), which, scattered by English guns and still more adverse elements, left its bones on the rocky coasts of Ireland and the Hebrides. Out of 130 vessels only 53 escaped destruction, and 20,000 of the best soldiers and seamen of Spain perished.

Philip died in 1598, having reigned forty-three years. He was succeeded by Philip III., his son by his fourth wife, Anne of Austria; his eldest son, Don Carlos, accused of a conspiracy against his father, having ended his days in 1568. During the reign of Philip III. the already declining commerce of Spain received a fatal blow by the expulsion of the Moriscos, or descendants of the Moors, the most ingenious and industrious portion of its population. This act cost the kingdom 600,000 of its best subjects, and reduced the public revenue from 30,000,000 to 11,000,000 ducats. In the reign of Philip IV. (1621–65) Portugal successfully revolted against its Spanish tyrants, and placed a scion of the house of Braganza on its throne (1640). Eight years later Philip was compelled to acknowledge formally the independence of the Seven United Provinces, virtually accomplished half a century before. His kingdom was also a sufferer by his alliance with Austria in the Thirty Years' War for he was compelled to cede to France the provinces of Roussillon and Perpignan, and to give his daughter, the infanta Maria Theresa, to Louis XIV., the object being to transform Spain into an appanage of the French crown.

On the death of Charles II. (1665–1700), without issue, the great war of the succession broke out, the Spanish throne being contested between Philip of Anjou as the grandson and representative of Louis XIV., and the Archduke Charles of Austria, brother to the Emperor of Germany (Joseph). To prevent the contemplated aggrandizement of France the maritime powers took up arms on behalf of the archduke, and a series of campaigns ensued, in which the Duke of Marlborough, as generalissimo of the allied armies, foiled the tactics of Louis XIV.'s generals, and inflicted on the French the great defeats of Blenheim, Ramillies, Oudenarde, and Malplaquet. But the unexpected death of the Emperor Joseph in 1711 completely changed the aspect of affairs. The archduke succeeded to the imperial throne, and Europe had now to fear the preponderance of the house of Austria. The peace of Utrecht was therefore concluded, which confirmed to Philip the crown of Spain, but stripped it of nearly all its consequence: Belgium, Naples, Sicily, and Milan were given to Austria; Sardinia to Savoy; and Minorca and Gibraltar to England.

In 1717 Spain, under the direction of Cardinal Alberoni, prepared to put aside the treaty of Utrecht, but the British government sent a fleet into the Mediterranean, which attacked and defeated the Spanish naval force at Cape Passaro, near Sicily (August, 1718), and almost annihilated it. Alberoni was dismissed, and a sort of armed truce resulted between the two powers, until a long series of petty insults induced England to declare war in 1739. Spain, however, soon found it necessary to conclude peace.

Philip V. died in 1746, his son, Ferdinand VI., without issue, in 1759. Ferdinand's half-brother, Charles III., then king of the Two Sicilies, succeeded him. His reign was marked by war with England, and by the great siege of Gibraltar, which terminated so brilliantly for the renown of the British arms. Charles IV. ascended the throne in

1788. His reign opened auspiciously, and Florida Blanca, a minister of genius and integrity, strove earnestly to revive the drooping commerce of the country, and to introduce many useful reforms into the administration of justice and the laws. Unhappily for Spain he was succeeded by the unprincipled Godoy, who inaugurated an era of shame, corruption, and imbecile misgovernment. In 1795 he declared war against Great Britain, but being defeated at sea, was compelled by the peace of Amiens, in 1802, to cede Trinidad. Hostilities were renewed in 1804, and the naval power of Spain sustained at Trafalgar, in the following year, a defeat from which it has never recovered. The intrigues of the court and the dissensions between Charles and his son Ferdinand provided Napoleon with a pretext for interfering in the internal affairs of the country, of which he was not slow to avail himself. He inveigled the whole of the royal family into his power at Bayonne, declared the Spanish throne vacant, and proceeded to place upon it his brother Joseph. French armies were poured into the peninsula, and Napoleon doubtless supposed that opposition was impossible; but the Spanish people suddenly awoke from their long lethargy: every peasant flew to arms, and supported by England, prepared to defend their cherished independence. Without Wellington and his soldiers, however, the struggle would have been quickly ended; and though the guerilla warfare embarrassed the French generals, it was British bayonets which expelled them from Spain. The Spanish armies, at all events in the first year of the struggle, were utterly useless; they fled on every field; their generals were either imbecile or treacherous; and no great and sustained exertion was made against the invaders. In the councils of the nation was neither vigour nor unanimity.

Our space will not allow us to enter into any detailed account of Wellington's peninsular campaigns, but we subjoin a tabular view of the principal actions by which they were distinguished.

Battle of Vimiera,	August 21, 1808.
" Talavera,	July 27, 28, 1809.
" Fuentes d'Onore, . .	May 6, 1811.
" Albuera,	May 16, 1811.
Storming of Badajoz, . .	April 6, 1812.
Battle of Salamanca, . .	July 22, 1812.
" Vittoria,	June 21, 1813.
" Pyrenees,	July 28, 1813.
" St. Jean de Luz, . .	November 10, 1813.
" Orthez,	February 27, 1814.
" Tarbes,	March 20, 1814.
" Toulouse,	April 10, 1814.

Ferdinand VII. was restored to his throne on the 14th of May, 1814. He commenced a career of despotic tyranny which drove his subjects into rebellion—a rebellion only suppressed by French bayonets (October, 1823), and which he punished by the most infamous massacres. In 1833 he left a distracted kingdom to his daughter, Isabella II.

His brother, Don Carlos, immediately raised the standard of revolt, contending that by the Salic law, which, however, had been repealed, the throne of Spain was hereditary only in the male line. He drew around him all the absolutists of Spain; the liberals espoused the cause of Isabella II. Civil war prevailed for several years, though by solemn treaty between the principal European powers the rights of Isabella II. had been acknowledged in 1834. The next event of importance was the great struggle between Espartero, the chief minister and virtual dictator, and the queen-dowager, Christina, for supreme power during the queen's minority. In 1843 Espartero was compelled to fly to England, and O'Donnell and Narvaez assumed the reins of government. Under their auspices a new constitution was arbitrarily proclaimed in 1845. The

infamous intrigues of Queen Christina procured her banishment in 1854. In 1858 the O'Donnell ministry was formed, which lasted until 1866, whose object it became to divert the attention of the Spaniards from their internal affairs by a show of spasmodic vigour in foreign policy.

The first movement in this direction was against Morocco. War was declared on trivial grounds, and Tetuan captured in February, 1860. In the following year Spain seized upon a portion of the island of St. Domingo, and joined with France in an armed intervention in the affairs of Mexico, from which, however, she soon found cause to withdraw. On the most trivial pretexts, too, Spain declared war in 1864 against the republic of Peru, and in the following year another of her former colonies, that of Chili, became the object of her vindictive anger; but the Chilean republic behaved with a firmness and determination that the Spanish government little anticipated. She refused to accede to any of the demands pressed upon her, and gallantly resisted every attack.

Meanwhile, the internal condition of Spain offered small grounds of hope or consolation to her best friends. The immorality of the court, the weakness of the legislature, the arbitrary policy of the government, and the selfish ambition of her chiefs, provoked constant risings, and a great portion of the country was for a long time under little better than military law. The death of Marshal Narvaez in March, 1868, removed from the councils of the queen the one man of energy and talent who still remained faithful to her interests. Gonzales Bravo and his colleagues, who succeeded to power, endeavoured to suppress all opposition by acts of wholesale violence. The deportation of a number of leading officers to the Canaries, and the sudden banishment of the Duke and Duchess of Montpensier, coupled with the increasing scandal attaching to the private life of the court, snapped the last ties which united Queen Isabella to her subjects. A visit of her majesty to San Sebastian in September was made the signal for revolt. The fleet led the way by pronouncing against the dynasty; the garrison of Cadiz joined the insurrection; and the banished generals made good their escape from their island prison. General Prim returned from exile; and within a fortnight of the outbreak the royal cause was abandoned by all its supporters. After an insignificant battle at Alcolea the army went over in a body to the insurgents; the queen sought refuge in France; and a provisional government, of which Prim, Serrano, and Topete were the leading members, was established at the capital, and received the adhesion of the provinces. On the 1st of October the Bourbon dynasty was virtually deposed. A general election took place in January, 1869, and the members of the Cortes then elected by universal suffrage decided by a large majority in favour of a monarchical form of government.

Considerable difficulty, however, was experienced in finding an occupant for the throne at once popular and willing. The Duke of Genoa, the King of Portugal, and Prince Leopold of Hohenzollern, each in turn declined the honour; and upon France demanding from the King of Prussia a perpetual guarantee against the Prince of Hohenzollern becoming king of Spain at any future time, there ensued the desolating Franco-German war of 1870-71. In the meantime a son was born to the eldest son of Victor Emmanuel, and the Duke of Aosta, thus no longer being heir-presumptive to Italy, was induced to accept Prim's repeated offer of the crown of Spain. On the 16th of November, 1870, the Cortes elected the duke by 191 votes, 63 only having favoured a republic and 22 the Duke of Montpensier. Amid great rejoicings at Madrid the new sovereign was at once proclaimed as King Amadeus I. He had not, however, been many weeks on the throne before the Carlist faction revived in new energy, and the republicans also determined to try their chance. Other events combined

to prove to the king that, however constitutional his call to the throne, a foreign monarchy would never take root in Spain. King Amadeus was received and treated from the first rather as a distinguished visitor than as a ruler elected by the Spaniards themselves. The king had the courage of his race, and would have been willing to grapple with the insurrections and other difficulties of the country, but did not feel disposed to be merely tolerated as a king. In the early part of 1873 he resigned the crown, and retired to his family and home in his own land, after a brief reign of two years. On his departure the republic was at once proclaimed, and the country again became involved in a frightful state of anarchy and confusion. Wearied with their mutual strife the various factions offered little resistance to the return of Bourbon rule, and in 1875 the son of the former queen was proclaimed as Alfonso XII. But Don Carlos, the son of the Don Carlos of Isabella's youth, still continued the wretched strife in the north, which had already paralyzed the productive powers of the country; the finances became, if anything, more involved than ever, while the war in Cuba threatened to turn the richest Spanish colony into a heap of ashes. Spain became, in fact, utterly and impotently prostrate. Early in 1876 the Carlist insurrection was suppressed, and the revolution in Cuba terminated in 1878. In January of that year the King of Spain was married to his cousin, the daughter of the Duke of Montpensier, but unfortunately she died in the following June, amidst the national regret. In 1879 he was married to the Archduchess Christine of Austria, but he died in 1885, and a posthumous son, born in 1886, was proclaimed king, under the regency of the queen.

SPANISH LANGUAGE AND LITERATURE.—Strabo informs us that various dialects were in use in his time among the inhabitants of the Peninsula, and that the Turditani had a written code of laws in verse. The Phœnicians and Greeks who settled in Spain must also have introduced their own languages, whilst the Celts, who occupied the north-western districts, spoke their own tongue. During the long period of Roman domination these languages seem to have made room for the Latin, except in the north and west of the Peninsula, where the Basque [see **BASQUE LANGUAGE**] was always, and is still, generally spoken. The northern nations who invaded Spain in the fifth century of our era adopted the Latin, which they corrupted by making the nouns indeclinable, as in their own rude dialects, and increasing the use of prepositions. Then came the Arabs, whose language spread over the whole Peninsula. Nearly two centuries after the capture of Toledo by Alfonso VI., Arabic was still spoken there in preference to the Castilian.

Of these heterogeneous elements the modern Spanish language is formed, although it would be difficult to say precisely at what time it began to assume its present shape. The earliest document written in Romance or Castilian hitherto discovered, bears the date of 1178. Owing to the splendid course of Spanish mediæval conquests the Spanish language is somewhat widely spoken. Its chief centres outside Spain are Mexico, Central America, Cuba, and some other West Indian Islands, the greater part of South America, and the Canary and Philippine Islands. Although Italian is a formidable rival, it is usually admitted that Castilian Spanish is the finest tongue in Europe for beauty of sound, since it has all the sweetness of Italian, with a gravity and grandeur all its own.

Literature.—The Romances or popular ballads of Spain were coeval with or subsequent to the formation of the Romance or Castilian language. After these the rhymed chronicle of the Cid ("Poema del Cid Campeador") is the oldest monument of Spanish literature hitherto discovered. It is written in a kind of rude Alexandrine, and bears evident traces of being founded on previous ballads which recorded the exploits of that warrior. The supposed author lived about the end of the twelfth century.

The annals of Spanish poetry continue barren of names until the middle of the fourteenth century, when the example of Alfonso XI. of Castile, and of his relative Don Juan Manuel, the celebrated author of "El Conde Lucanor," a book of tales with moral and political maxims, operated powerfully on the Castilian nobility. It was not, however, until the age of John II. (1407-64) that a spirit of improvement was discernible in the ancient national poetry. Among the noblemen who composed the poetical court of John II., Don Enrique, marquis de Villena, was one of the most distinguished by his classical learning and his talents. Besides a translation of the *Æneid* in verse, which has been lost, he wrote a mythological and moral work, entitled "Los Trabajos de Hercules" (the Labours of Hercules), which was printed for the first time at Zamora, in 1483, folio. His pupil, the Marquis de Santillana, naturalized the Italian sonnet in Castile; and his epistle to Don Pedro, constable of Portugal, on the origin of Castilian poetry, is invaluable.

Of the state of Spanish poetry under Ferdinand and Isabella, a notion may be formed from the perusal of the "Cancionero General," where fifty Castilian noblemen figure as authors. Don Jorge Manrique wrote his beautiful moral couplets ("Coplas de Don Jorge Manrique," Sev., 1494), which have been been admirably translated into English by the American poet Longfellow. Traces of the origin of the Spanish drama are first visible in this reign. During the fifteenth century the Spaniards possessed their religious mysteries and their farces, like the rest of Europe. In 1414 the Marquis de Villena composed an allegorical play ("Comedia Alegorica"), which was performed at the court of Aragon at the coronation of Ferdinand. In the reign of Ferdinand and Isabella considerable progress was made in historical writing. Alonzo de Palencia; Bernaldez, whose valuable chronicle is still unpublished; Pedro Martyr de Angheria, or Anghiera, the author of the "Opus Epistolarum" (Alcalá, 1530); Antonio de Valera, who, besides his chronicle of "Ferdinand and Isabella," wrote a general history of Spain (Saragossa, 1492), which was reprinted five times before 1500; Lucio Marinéo Sículo ("Obras Historicas" (Alcalá, 1530), Antonius Nebrissensis, or de Nebrija (Granada, 1550), who was also the author of a Latin and Spanish Dictionary (Sev., 1506), and several grammatical and philological works; and lastly, Pulgar ("Reyes Catolicos," Vallad., 1565) flourished during this reign. The conquest of Granada (1492) gave a new impulse to the ballad poetry of Spain. It became the fashion among the Spanish romance writers to select from the events of Moorish history materials for their songs. Such is the origin of the "Romances Moriscos," or Moorish ballads, with which the Spanish Romanceros are filled, and which have erroneously been considered as the work of converted Moors, or as translations from Arabic songs. Many of them have been admirably rendered into English by J. G. Lockhart.

Hitherto Spanish literature had developed itself without losing any of its ancient forms, and a true national spirit prevailed in all the works, but the Italian wars having brought the Spaniards into contact with Italy, a change was effected in the national taste. The introduction of the style and forms of Italian poetry was chiefly due to Juan Boscan Almagavar, who, by imitating the classical models of antiquity, and incorporating into Castilian poetry the excellencies of the Italian poets, gave a new direction to the literary taste of his countrymen. He was assisted by his friend Garcilaso de la Vega, whose beautiful eclogues, in the style of the "Arcadia" of Sannazaro, are still unequalled, and of which an excellent English translation in verse has been made by Mr. Wiffen. The next Spanish poet who followed in the path of Boscan was Don Diego Hurtado de Mendoza, the minister of Charles V., well known for his classical learning, his fine collection of

Greek MSS., and for his labours in almost every branch of literature. Saa de Miranda and Jorge de Montemayor, both natives of Portugal, though they wrote chiefly in Spanish, imitated Italian models. The latter was the author of a pastoral romance entitled "*Diana*," which was soon translated into almost every European language. Pedro Padilla was another successful writer of pastoral poetry ("*Eglogas Pastoriles*," Sev., 1482), into which he introduced the Italian and ancient Spanish metres. Fray Luis de Leon drew his inspiration from the classics, and principally from Horace, and his metrical versions of the Psalms and part of the Book of Job are inimitable.

The attempts of the Spaniards to imitate the romantic epic of the Italians failed, nor were they more successful in their serious efforts. Even the "*Araucana*" of Ercilla, "*Las Navas de Tolosa*," by Christoval de Mesa, and "*El Bernardo*," by Balbuena, are far beneath the "*Gerusalemme Liberata*" of Tasso or "*As Lusiadas*" of Camoens. But dramatic poetry during this period, and principally during the first half of the seventeenth century, made great progress. Torres Naharro, Lope de Rueda, Cervantes, and especially Lope de Vega, contributed to improve the Spanish drama. In fertility of invention Lope de Vega is unparalleled: according to his own statement he required no more than twenty-four hours to write a versified drama of three acts, interspersed with sonnets, tercets, and octaves, and abounding in interesting situations. He sometimes wrote a play in three or four hours. This astonishing facility enabled him to supply the Spanish theatre with upwards of 2000 original dramas, all in verse, of which only about 400 have been printed. Calderon followed, but his genius was of a higher and graver cast than that of his predecessor. Until the latter end of the eighteenth century the plays of Lope de Vega, Calderon, and the writers of their respective schools, were universally acted throughout Spain. Even now some of the best are still brought on the Spanish stage, though they have been recast or modernized. Calderon's "*Prodigioso*" has been translated into English by Shelley, and some of his poems by Archbishop Trench. Lope de Vega has afforded numerous hints for plot and incident to the dramatists both of England and France.

About this time (1615-35), a new, irregular, and fantastical style was introduced into Spanish poetry, upon which the Italian school of the Marinists began to exercise a considerable influence. Manoel de Faria e Sousa, a Portuguese by birth, was one of the first to adopt in his writings that turgidity and affectation which marked the Italian poets. Luis de Gongora carried this bombastic and forced style to the highest pitch, and he soon found a host of admirers, who were called Gongoristas, from the name of their leader, but who gave themselves the more honourable appellation of *cultoristas* (or writers in cultivated style), in opposition to the simple but irregular effusions of the national school, at the head of which was Lope de Vega. This innovation, however, was not without opponents: the two brothers Argensola, Manuel de Villegas, Juanqui, Espinel, and others, whilst censuring the style of their antagonists upheld the national school; and Quevedo assailed them most bitterly in his "*Culta Latiniparla*." But Gongora's admirers were not easily defeated. A new school, called the Conceptistas, in imitation of the Italian term *Concettisti*, applied to the followers of Marino, started up, who, without the vigorous mind and superior talents of their model, carried to excess the empty pomp and verbose obscurity of his artificial language. The cultivation of prose during the above period did not keep pace with that of poetry. The imitation of the ancient classics was considered the only means of improving it. The learned theologian Fernan Perez de Oliva was the author of a dialogue on the dignity of man ("*Dialogo de la Dignidad del Hombre*," Madrid, 1772, 4to) written in the manner of

Cicero, which is perhaps the best fragment of didactic prose in Spanish literature. He was followed by his pupil and nephew, the learned Ambrosio Morales, historiographer to Philip II., whose works on the history and antiquities of the Peninsula are greatly esteemed, and have been largely followed by Prescott and others.

After imitating for some time the Italian novelists the Spaniards invented a kind of novel, which, by way of distinguishing it from the pastoral romances in prose and the numerous romances of chivalry, received the name of *Novelas del Gusto Picaresco* (or "novels of vagabond life"). The "*Lazarillo de Tormes*," by Diego de Mendoza, which appeared for the first time at Antwerp in 1558, and was speedily translated into French, Italian, and English; "*Gusman de Alfarache*," by Mateo Aleman; "*El Escudero Marcos Obregon*," by Espinel; "*La Picaara Justina*," by Ubeda; "*La Garduna de Sevilla*," by Salas Barbadillo (Madrid, 1642); "*El Bachiller Trapaza*," by Castillo Solorzano, are fair specimens of this style of writing, which is peculiar to Spain. Nor can we pass over the *Novelas Ejemplares* of the inimitable Cervantes, whose "*Don Quixote*" is, independently of its other merits, the most classical work in the Spanish language, and which has secured a world-wide reputation. The influence which it exercised in Spain has not been surpassed by that of any work in any country, and it may justly be said to have stamped out the last flickering embers of feudal chivalry. It is one of the great masterpieces of fiction, whose characters have become household words in every European language.

About the beginning of the eighteenth century French literature began to diffuse its spirit over the whole of Europe, and it was natural that Spain, where Philip V. had instituted academies on the model of the French, should look up to France. Ignazio de Luzan must be regarded as the founder of this new school. Luyando undertook to introduce regular tragedy on the Spanish stage, and with this view produced two dramas, entitled "*Virginia*" and "*Athaulfo*." Velasquez, Nasarre, and Mayans endeavoured to introduce the French style into other branches of literature. But the mass of the nation still clung to the old forms; romances were still written and sung. Garcia de la Huerta, an academician and librarian to the king, attempted to revive the taste for ancient national literature, by publishing a collection of the best Spanish dramas ("*Theatro Escogido*," Madrid, 1785), and writing a tragedy entitled "*La Raquel*," which was intended to combine the old Spanish models with the dignity of the French tragic style, without, however, being subject to the rules of French dramatic art. In the second half of the last century, under the rule of Charles III., Spanish literature was in some manner revived by the labours of the two academies at Madrid, but chiefly through the encouragement given by the *Academia de la Lengua*, which distributed prizes among the best poets. Some epic essays by Vargas Ponce and the elder Moratin show that the poetic genius of the Spaniards was not altogether extinct. Don Thomas Yriarte wrote a didactic poem entitled "*La Musica*;" Juan Melendez Valdez (born 1754) completed the movement by founding the "*Salamanca*" school. His most characteristic works are some Anacreontic odes not inferior in merit to those of Villegas. Cienfuegos, Salas, Quintana, Arriaze, Santos Pelegrin, Lista, Noroña, Gorostiza, Mora, Cadalso, the author of the "*Cartas Marrueras*," and many others, distinguished themselves in the various kinds of lyric or dramatic poetry. To Moratin the younger the Spanish stage was greatly indebted, and he was the first who introduced the true comedy ("*Comedia de Costumbres*") after Molière and the best French comic writers.

Among more recent writers Martinez de la Rosa is one of the most successful. As a comic writer he is considered equal to Moratin. He has, moreover, gained great repu-

tation as the author of several tragedies, of which "La Viuda de Padilla" and "Edipo" are the most esteemed. An epic poem on the siege of Saragossa; a drama in prose, entitled "La Conjuracion de Venecia" (the Conspiracy of Venice), an art of poetry in imitation of that of Boileau, a political work, entitled "El Espiritu del Siglo" (the spirit of the age), and several lyric poems, show his powers for all branches of literature. A new school of dramatic writers has also been formed in Spain, whose object seems to be to combine the French drama of the school of Victor Hugo and Dumas with the old national style. One of the best known novelists of the day is Catherine Bohl, who writes under the name of Fernan Caballero.

Spanish Drama.—In Spain, as elsewhere, it was the church that gave birth to the modern drama. The earliest theatrical performance of which we find any mention in Spanish annals, is that exhibited in 1414 at the coronation festival of Ferdinand the Good, king of Aragon. It was from the pen of the Marquis de Villena, and it seems to have belonged to the class of Moralities in vogue in the infancy of the Spanish drama.

It was near the close of the fifteenth century that a sort of theatre was first established in Castile. The earliest dramatic attempt in this division of the peninsula was made by Juan de la Encina, who, besides numerous other poetical works, composed some small pastoral pieces, which combined the elements of the comedy, the ballet, and the vaudeville. The first performance of these pastoral comedies took place in 1492. In the beginning of the sixteenth century the first regular Spanish dramas were produced, though not in Spain. Bartolome de Torres-Naharro composed some comedies in his native language, which were performed at the court of Leo X. at Rome, at the same time that the "Mandragola" of Machiavelli and the productions of Aretino were being exhibited there. In the compositions of Torres-Naharro there is invention, well-drawn character, and spirited dialogue; they have also the licentious tone of the Italian comedies of that period, and contain satires against the church such as Luther himself might have dictated. No sooner did Naharro's pieces find their way to Spain (about 1520) than they were proscribed by the Inquisition. These and other first attempts in regular dramatic composition having been suppressed, found no imitators, and were soon forgotten.

The founder of the truly national theatre of Spain was Lope de Rueda of Seville, who quitted his trade of a gold-beater to join a company of strollers, of whom he shortly became the chief. For a number of years he perambulated from town to town, but his great reputation at length made him in request at court.

About 1580 were established at Madrid the two theatres de la Cruz and del Principe; and some superior minds turned their efforts to dramatic composition. Cervantes, just returned from his eventful Algerine captivity, was one of the earliest adventurers in this career. [See CERVANTES.] He wrote at Madrid; and at the same time Juan de la Cueva produced some dramas on the stage of Seville. Cristobal de Virues, a Valencian poet, reduced the number of acts from four to three. The scenery of the Spanish theatre was also considerably improved.

Already, in the sixteenth century, we find in Spain the content fully and warmly engaged in between the claims of the dramatic writers to an absolute independence of the classic rules, and the critics demanding a rigid adherence to the precepts of Aristotle. Thus, while the rhetorician Pinciano was exhorting the theatrical writers to respect the unities, Juan de la Cueva undertook, in his "Exemplar Poetico," the defence of the dramatic liberties. In the midst of these contests arose Lope de Vega, who is noticed in our account of the literature of Spain.

In 1621, twelve years before his death, happened that of the gloomily devout Philip III., who was succeeded by a

young prince addicted to pleasure, passionately fond of the theatre, and himself a reputed poet. These circumstances added force to the impulse already given, and introduced the most brilliant period of the Spanish drama.

Near the close of Lope de Vega's dramatic reign appeared Calderon de la Barca, who was destined in some degree to dethrone him. It is in the class of *Autos Sacramentales*, or religious dramas, that the genius and spirit of this fine poet are most richly and fully developed. As the religious ceremonies of paganism had given birth to the Grecian theatre, so did those of Christianity give birth to the modern. The original principle of the dramatic spectacles, introduced or sanctioned by the Romish ecclesiastics, was that of exhibiting before the eyes of the faithful, on each of the great festivals of the church and commemoration days of the saints, a living representation of the passage of the New Testament or of legendary history to which the celebration in question referred. These performances, which in all the rest of Europe went by the name of Mysteries, were in Spain called from the beginning Divine Plays (*Comedias Divinas*) and Sacramental Acts (*Autos Sacramentales*). They were performed with great pomp, not only in the public squares and in processions, but also at the great theatres of the capital. Lope de Vega wrote some hundreds of these pieces, but Calderon, in this department as in others, so far excelled both his predecessors and his contemporaries, that letters patent were granted to him conferring the exclusive privilege of furnishing the *Autos* for the use of the capital—a monopoly which he enjoyed for thirty-seven years.

In the course of Calderon's protracted career arose Moreto, who with less of the national fire of invention and richness of fancy, distinguished himself chiefly by giving a more perfect development to the plays of character, and may be regarded as one of the models of Molière. Fray Gabriel Tellez, a monk, lived about this time, and under the assumed name of Tirso de Molino, gave to the stage a number of pieces, which were afterwards collected and published by his nephew. He was the first who dramatized the story of "Don Juan and the Statue," availing himself of the legend invented by the Franciscan monks of Seville to account for the disappearance of the real Don Juan de Tenorio, whom, in order to terminate quietly his notorious excesses and impieties, the holy brethren had drawn into an ambush and slain.

During this most brilliant period of the Spanish theatre there was a host of dramatists of the second order; but the disasters which befel the Spanish monarchy in the latter years of the reign of Philip IV., and the decree of the queen-regent soon after his death, "that all plays do cease until the king my son shall be old enough to be entertained by them," produced a rapid decline in the dramatic art, during which period only one author worthy of notice appeared—Solis, the eloquent historian of the conquest of Mexico, who left several plays of surpassing merit.

With him may be said to have expired the Spanish theatre properly so called, the elevation of Philip V. to the throne of Spain having given prevalence to the French taste. In the course of the eighteenth century, it is true, some attempts to re-erect a national drama were made successively by Zamora, Luzan, Canizares, and Jovellanos; but to arrive at a work of originality we must come down to the commencement of the present century, to Moratin and Martinez de la Rosa, who are both noticed at the end of our account of Spanish literature.

Misled apparently by the word *Comedia*, which in Spanish has always had as comprehensive a signification as the English term *Play*, many of the most eminent continental critics, especially among the French, have alleged a total absence of tragedy in the Spanish theatre, and spoken of it as a singular and unaccountable phenomenon. This is

by no means the case. Boscan, who first introduced into Spain the Italian style of versification, made a translation from one of the tragedies of Euripides, which has not been preserved; and about 1520 the learned Fernan Perez de Oliva wrote two other imitations of the Greek theatre, the "Venganza de Agamemnon," taken from the "Electra" of Sophocles, and the "Ilecuba," translated from Euripides. These tragedies, written in elegant prose, remained unknown beyond the universities; nor have we reason to suppose that they were acted even there. About 1570, however, Juau de Malara gave to the theatre of Seville several tragedies on scriptural subjects, as "Absalom," "Saul," &c.; and at Madrid, then recently chosen to be the capital of the kingdom, a monk named Geronimo Bermudez produced, under the name of Antonio de Silva, two tragedies founded on the remarkable history of Inez de Castro. About the same time also, at Valencia, were played various dramas, still more remarkable, composed by Cristoval de Virues and by Andres Rey de Artieda. Virues opposed the classic rules, in which he was followed by Juan de la Cueva, who, after imitating the "Ajax" of Sophocles, brought out at Seville two original tragedies; one, "Las Sieta Infantes de Lara," founded on a popular tradition; the other, taken from Roman history, and combining two tragic subjects, the death of Virginia and that of Appius Claudius. Meanwhile, at the Madrid theatre, the tragedies of the friar Bermudez were succeeded by those of Lupercio de Argensola, to which Cervantes gives high praise.

It is plain how much the romantic spirit predominates over the classical, even in these productions (professedly tragic) of the old Spanish stage. When, however, the accession of Philip V. had brought the Spanish theatre within the influence of Parisian taste, not only were the French tragic poets translated into the language of Spain, but some attempts were also made by the Spanish poets to imitate them. Of this number were the "Virginia" and the "Ataulfo" of Montiano. Subsequently, under the ministry of the Marquis d'Aranda, this endeavour was resumed by Fernandez de Moratin, Cadalso, and Garcia de la Huerta. At the commencement of the present century the like effort was made with better success by Don Nicasio Alvarez de Cienfuegos, who produced his tragedies of "Idomeneo," "Pitaco," and "Zoraida." Quintana was also the author of some excellent tragedies.

SPAL'AX. See MOLE-RAT.

SPAL'DING, a market-town of England, in the county of Lincoln, on the Welland, 33 miles S.S.E. of Lincoln, and 93 from London by the Great Northern Railway. Though within the fens, the town is well drained, the streets clean and well paved, and the houses have a neat appearance. It has a spacious market-place, at one end of which is the town-hall. The parish church, originally erected in the thirteenth century, but rebuilt, with some additions, during the fifteenth, is a light structure in the Perpendicular style, with a fine tower and crooked spire, and a handsome porch. There are places of worship for Independents, Baptists, Wesleyans, Friends, and other dissenters, and many charities. There are assembly rooms, a subscription library, and a literary club; and formerly an antiquarian society was established at Spalding, of which Sir Isaac Newton, Sir Hans Sloane, Dr. Stukely, and other eminent persons were members. The Welland is navigable thus far for vessels of 100 tons burden. Spalding has a considerable trade in corn, timber, oil-cake, and wool. The population in 1881 was 9260.

SPALLANZA'NI, LAZ'ARO, a famous Italian physicist, was born at Scandiano, a small town near Reggio, in Modena, on 12th January, 1729. His early education was directed by his father, J. N. Spallanzani, who had considerable reputation as a lawyer; and when he had reached the age of fifteen he was sent to the Jesuits' College at Reggio, where he remained for several years. He

then repaired to the University of Bologna; and while there his studies were directed by his kinswoman, the celebrated Laura Bassi. He had early imbibed a fondness for the natural sciences; but his family insisted on his adopting his father's profession, and he had completed the studies necessary for obtaining the degree of doctor of laws before he could obtain permission to abandon a pursuit which was extremely distasteful to him. Immediately on quitting the profession of the law he embraced the ecclesiastical habit, and diligently applied himself to the study of languages. In the year 1754 he was chosen to fill the vacant chair of logic, metaphysics, and Greek literature in the University of Reggio.

In 1761 he accepted a professorship at Modena, and from this time dates the commencement of the high reputation which he acquired by his investigations into different branches of natural science. In 1766 he published a sketch of a work on the reproduction of animals; and though during his subsequent life he completed only a part of the researches which he had planned, yet his labours are invaluable.

His treatise on the circulation of the blood led to his being invited to become natural history professor at Pavia; and on entering on his new duties, to which those of director of the museum were soon added, he entirely gave up literary pursuits. His efforts were chiefly directed to elucidating the subject of the circulation of the blood and the functions of respiration, digestion, and generation. The number and ingenuity of his experiments are not more striking than his close and logical reasoning. Besides his larger works, Spallanzani contributed numerous papers on natural history to the transactions of various learned societies. Nor did he rest content with that knowledge only which could be acquired by books, or which the museum of Pavia or the surrounding country might afford, but he undertook journeys to different parts of Europe. He died at Pavia, 12th February, 1799.

SPAN'DAU, a strongly fortified town of Prussia, in the province of Brandenburg, at the junction of the Havel with the Spree, 7 miles west of Berlin, on the railway from Berlin to Hamburg. The population in 1881 was 29,311. It has war material factories, some woollen industry, and an extensive trade. At a tower known as the Juliusthurm a sum of 120,000,000 marks is kept in specie as a war reserve; it is regularly inspected by government officials. Each inspector possesses a key, and the outer door is provided with two locks, which will not open unless they are both turned simultaneously. The money is put away in 120 subdivisions of a million marks each. Several of these lots are taken out at hazard, and the number of coins in them verified, after which a report is signed by the two officials certifying that the money remains intact. The Church of St. Nicholas, constructed in the sixteenth century, has a great number of monuments. Spandau was the scene of Baron Trenck's captivity. It was taken by the Swedes in 1681, and the French in 1806.

SPAN'DREL, the triangular space between the outside of an arch and a square head, or between two arches springing from the same pier or column, usually occupied with rich carving.

SPAN'IEL is a variety of DOG, characterized by long silky hair, often curled and shaggy, and large pendulous ears. It is an ancient variety, and the idea, based on the name, that it originated in Spain, is probably erroneous. There are various breeds. The Common Spaniel has long been used for sporting purposes, having been in former times employed in hawking to assist the falconer. It is powerfully built, but elegant in form, with very long ears and beautifully waved hair, usually red and white in colour. Its scent is acute, and it takes readily to the water. It is very intelligent and docile. The Water Spaniel is larger, and has closely-curved hair and shorter ears. It is greatly

used in water-fowl shooting as a retriever. The **SETTER** is another breed of spaniels. The Springer and Cocker are two small varieties used in pleasant and woodcock shooting; the colours are various, black, black and tan, red and white, liver-colour and white, &c. The King Charles' Spaniel is a small beautiful dog, prized as a lady's pet. It has very long silky hair, black and white, or black and tan, very long pendulous ears sweeping the ground, a round prominent forehead, and large moist eyes. The Blenheim Spaniel is a very similar dog, also a drawing-room pet.

SPANISH ARMADA. See **ARMADA**, **SPANISH**.

SPANISH FLY (*Cantharis vesicatoria*) is a beetle belonging to the family **CANTHARIDÆ**. The Spanish fly, or blister beetle, is about three quarters of an inch in length, and of a bright green colour; the legs and antennæ are bluish-black. The species is found on the continent of Europe, but rarely occurs in England, where it is not considered indigenous. When touched, these insects feign death and emit an odour of a highly penetrating nature. Their larvæ live in the ground, and feed upon the roots of plants. The insects are used in the composition of strong blisters, an active principle being obtained from them which is largely used in medicine. Spanish flies are imported chiefly from Hungary, Russia, and Siberia.

SPANISH SUCCESSION, WAR OF THE, the name given to a celebrated war which took place on the Continent in the time of Queen Anne of England. Upon the death of Charles II. of Spain, in 1700, Louis XIV. of France proclaimed his grandson, Philip of Anjou, King of Spain, with the title of Philip V. The House of Hapsburg produced a rival in the person of the Archduke Charles. The Grand Alliance, comprising England, Holland, Austria, Germany, Portugal, and Savoy, wished to maintain the balance of power, resolved on supporting the claims of the Archduke Charles, while the French King was supported by Spain and Bavaria. The formal declaration of war took place on the 15th of May, 1702, at London, Vienna, and the Hague. There were four theatres of strife—viz., Belgium, the valleys of the Middle Rhine and the Upper Danube, Spain, and the north of Italy. In this war were fought the famous battles of Blenheim, Ramillies, Oudenarde, Malplaquet, &c.; and Gibraltar was besieged and taken by the English, in whose hands it has ever since remained. The war was brought to an end by the treaty of Utrecht (11th April, 1713). The leading conditions of the treaty were—(1) That the Protestant succession in England, in the house of Hanover, should be recognized by France; (2) that there should never be a union between the two crowns of France and Spain; (3) that England should hold Gibraltar, the island of Minorca, Hudson's Bay, Nova Scotia, and Newfoundland; (4) that the fortifications of Dunkirk should be destroyed; (5) that Philip should hold Spain; (6) that the Duke of Savoy should have Sicily; and the Emperor Sardinia, Milan, Naples, and the Netherlands. By this war the National Debt of Great Britain was increased by twenty-two millions sterling.

SPANISH TOWN, the capital and seat of the legislature of Jamaica, on the river Coire, about 6 miles from the sea, and 11 miles W.N.W. of Kingston. It is the official residence of the governor and the commander-in-chief, and the seat of the court of chancery and the supreme court of judicature, but has otherwise very little importance. The population is 8000.

SPANK'ER, a large quadrilateral sail, with parallel sides, hoisted between the gaff and boom of a vessel, the fore-leech being attached to the mast by iron rings.

SPARGAN'UM is a genus of plants which with the genus *Typha* (**REED-MACK**) constitute the order **TYPHACEÆ**. The species are found commonly in ditches and marshes of the northern hemisphere. Three of these are

common in Great Britain, where they are called **Bur-reeds** (*Sparganium ramosum*, *Sparganium simplex*, and *Sparganium natans*). The roots of the first two species were formerly used medicinally under the name *Radix sparganii*, and were supposed to cure snake-bites. They grow to a height of 1 or 2 feet, and have long linear leaves and monœcious flowers collected in globular heads.

SPAR'IDÆ. See **SEA-BREAM**.

SPARRMAN'NIA is a genus of plants belonging to the order **TILLACEÆ**. One species, *Sparrmannia africana*, a native of the Cape of Good Hope, is much cultivated in greenhouses. It is a beautiful shrub, flowering in the beginning of spring. It is from 8 to 12 feet high, with long-stalked heart-shaped leaves, and umbels of soft, downy, white flowers, which have numerous stamens with yellow filaments and purple anthers.

SPARROW (*Passer*) is a genus of birds belonging to the order **PASSERES** and the family **FINCHES** (*Fringillidæ*). The House Sparrow (*Passer domesticus*) is one of the best known British birds, remaining throughout the year. It is widely distributed throughout Europe, extending to Persia, India, and Ceylon, and also to Egypt and Northern Africa generally. Everywhere it displays the same fondness for the habitations of men, living and breeding even in the midst of great cities. In cities it builds a nest of hay and other substances with a lining of feathers in nooks of buildings, &c. Sometimes, however, the nest is placed in the branches of a large tree, and sometimes it lays its eggs in the nest of the house martin, dispossessing the rightful owner. The eggs are five or six in number, greenish-white in colour, blotched, spotted, streaked, or suffused with ash colour and dusky brown. Three broods are usually reared in the year. In summer sparrows do great damage in the cornfields by feeding on the ripening grain; but as they feed their young on noxious insects and their larvæ, chiefly the latter, it is a question whether they do not thus more than compensate for their depredations. The sparrow is about 6½ inches in length. The plumage is too well known to need description, but it may be pointed out that the sexes differ remarkably in colour, the prevailing colour in the male being various shades of gray, while the female has the head and neck brown and the under surface a pale wood-brown, rather darker on the sides. The house sparrow has been introduced into the United States, where it thrives and multiplies at the expense of other indigenous birds. In the Iberian peninsula and in Italy it is replaced in some measure by two other species, *Passer hispaniolensis* and *Passer italia*.

The Tree Sparrow (*Passer montanus*) is a smaller species of sparrow found usually in the open country at a distance from human habitations. It is much less abundant than the house sparrow in Britain, and is rather local; it is also less numerous in Europe and Asia. It builds its nest in trees, frequently in the pollard willows that fringe our rivers and canals. It feeds on insects and seeds. It is about 5½ inches long, with the upper surface bright orange-brown, the top of the head dull brown, and the breast and belly dull brownish-white.

North America has several nearly allied species of sparrows. The Song Sparrow (*Zonotrichia melodia*) is very common in the United States, migrating to the south in winter. Its song is sweet and prolonged. The general colour of the plumage above is reddish-brown with dark brown streaks and grayish edgings; the lower surface is white, the breast and sides streaked with dark chestnut. It nests both on the ground and in bushes, and feeds on insects, seeds, and berries.

SPARROW-HAWK (*Accipiter nisus*) is a bird of prey belonging to the family **FALCONIDÆ** and subfamily *Accipitrinæ* (**HAWK**). It is one of the most abundant of our hawks, being found in most wooded districts, and is common in most parts of Europe, extending through

Northern Asia to Japan, and visiting India in winter. The sexes, as in most of the family, differ greatly in size and plumage. The female is 15 inches in length, while the male only measures 12 inches. In the female the upper surface is brown, with a small white spot on the nape; the primaries and tail are light brown with dark transverse bands, and the under surface grayish-white with brown transverse bars. In the male the brown of the upper surface is replaced by dark bluish-slate; the tail is grayish-brown with from three to five dark transverse bands, and the lower surface is reddish with numerous transverse bars of dark reddish-brown.

The sparrow-hawk is exceedingly graceful in its form and active in its habits, its long wings enabling it to fly with great rapidity, whilst its broad and powerful tail renders it capable of performing the most astonishing evolutions with ease. When hunting for its prey it usually glides swiftly along at a height of only a few feet above the fields, occasionally passing up one side of a hedge and down the other, its bright eye always watching for an opportunity to dart upon its victim. It sometimes pursues birds upon the wing, but usually pounces down upon them when resting either on the ground or on the branch of a tree or bush, and its descent upon its quarry is performed with the most surprising celerity. But the sparrow-hawk does not always content himself with a diet of small birds and field-mice; young rabbits, leverets, and partridges are often destroyed by him in the fields, and occasionally he pays a visit to the habitations of man, and carries off chickens from the poultry-yard or pigeons from the dovecot with the utmost audacity. Even the presence of man does not at all interfere with the predatory plans of this daring little marauder; he skims along at a little distance from the ground, snatches up his prey in an instant, sometimes almost from under people's feet, and dashes off with it before an alarm can be given. In the palmy days of falconry the sparrow-hawk was a favourite bird, being flown at such small quarry as landrails, partridges, thrushes, and blackbirds.

The nest of the sparrow-hawk is usually built in a tree, but in some of the Hebrides, where trees are wanting, the bird builds among the rocks. The nest is nearly flat, rudely composed of sticks and twigs, with a little grass, moss, or wool in the centre for the reception of the eggs, which are four or five in number, and are of a bluish-white colour, with deep brownish-crimson blotches and spots. Very often this hawk does not take the trouble to build a nest, but seizes upon the deserted dwelling of some other bird, usually a crow.

SPAR TA or LACEDÆ MON, in antiquity, the capital of Laconia, and the chief city of the Peloponnēsos. It was on the right bank of the Eurōtas, between the tributaries Oīnos and Tīasa, about 20 miles from the sea, in a valley of remarkable beauty and fertility, bounded W. and E. by the ranges of Taygetos and Parnon. It was about 6 miles in circumference, and consisted of distinct quarters, which were originally separate villages. During its most flourishing period it was unfortified, being protected by the natural ramparts of the valley. Its quarters were Pitane in the north, the favourite place of residence, Kunosoura in the south-west, Linnai in the east along the Eurōtas, and Mesoa in the south-east. Aigidaī, in the north-west, adjoining Pitane, is also mentioned by some writers, but it was in all probability the name of a tribe or family, and not of a quarter. On the acropolis were the temples of Athena Chalkiokos, the tutelary goddess of the city, of Athena Ergane, the Muses, Zeus Kosmetas, and Aphroditē Areia, and many statues in honour of divinities and heroes. In the Agora, near the acropolis, and adorned with temples and statues, were the council house of the senate and the offices of the public magistrates, the Persian *stoa* built of spoils taken in the Persian War, and the place

called Chorus where Spartan youths danced in honour of Apollo. Two principal streets, named Aphetais and Skias, extended nearly parallel to each other from the Agora, the former to the south, the latter to the south-east extremity of the city. Upon the largest of the Spartan heights was the theatre, a magnificent building of white marble, the two wings of which still remain, 430 feet apart, built of massive quadrangular blocks, and forming the most important relics of the ancient city. The private houses of Sparta, and even the palace of the kings, were always simple and unadorned, but it was equalled by few other Greek cities in the magnificence of its temples and statues. The modern town of Sparta, built since the War of Independence, occupies one of the hills in the south part of the ancient site. Its streets are laid out on a large scale, and it has a population of about 8000. The nomarch and other officials of Laconia reside here. The villages of Magula and Psychiko are near it, and 3 miles west of it is Mistras, which was the chief place of the district in mediæval and Turkish times.

According to tradition, the Leleges were the most ancient inhabitants, and Lelex the first king, in the vale of the middle Eurōtas. Lacedæmon, son of Jupiter and Taygete, married Sparta, third in descent from Lelex, and gave the name of his wife to the city which he founded, and his own name to the people and country. During the mythical era of the Achaian monarchies, Menelaus reigned at Sparta, Agamemnon at Mycenæ, and Diomedes at Argos. After the Dorian invasion and conquest of the Peloponnēsos, under the Herakleids, Sparta fell to Eurysthenes and Prokles, the twin sons of the Herakleid Aristodemus; and from that epoch date the long succession of two joint kings, and the distinction between the conquerors, who were called Spartans, and the native Achæians (*Periōikoi*), who became tributary. At first inferior to Argos, Sparta became the chief of the Dorian powers only after the institutions of Lycurgus had made it a nation of professional soldiers. The introduction of the Lycurgan discipline (not later, according to Grote, than 825 B.C.), the earliest determinable event in its internal history, was followed by aggressions which gradually extended its sway over the greater part of the Peloponnēsos. There is no certain personal history of Lycurgus, and his very existence has been doubted by critics. (See A. Trierber, "Forschungen zur spartanischen Verfassungsgeschichte," Berlin, 1871). The Lycurgan legislation has been called the codification of the usages of the Doric race. It recognized three classes of persons: (1) the Spartans, of Dorian stock, resident in the city, alone eligible to public offices, all warriors, supported from the lands around the city which belonged to them, and being disfranchised when they failed to pay their quota to the public mess; (2) the Periōikoi or Læconians, freemen of the neighbouring townships, with no political power, devoted to agriculture and industry, paying rent for their land, and forming bodies of heavy-armed soldiers in war; and (3) the helots, or serfs, bound to the soil, which they tilled for the Spartan proprietors, and by whom they were employed in domestic and military service. The division of land into 9000 lots for Spartans, and 30,000 lots for Periōikoi is doubted by Grote; and the number of Spartan citizens diminished from the era of the Persian War, when Herodotus estimated them at 8000, to the time of Agis IV., when they had dwindled to 700, of whom 100 alone possessed most of the landed property of the state. At the head of the government were two hereditary kings, whose power was gradually restricted till their position was one of nominal honour rather than real authority. The legislative power was exercised by two assemblies, that of the elders and that of the citizens; the former was composed of the two kings and twenty-eight members, aged at least sixty years, who were judges in capital cases, and initiated and discussed all measures submitted to the

popular assembly; and the latter, composed of all Spartan citizens of thirty years of age and of unblemished character, met once a month, and had the right to approve or reject measures by acclamation, but not to amend them. The ephors, corresponding to the Roman tribunes of the people, and probably of later origin than the age of Lycurgus, were the representatives of this assembly, and during the Peloponnesian War exerted despotic authority, having completely superseded the kings as directors of affairs. The most important part of the Lycurgan legislation related to the discipline and education of the citizens. The individual was held to exist exclusively for the state, to which he should devote all his time, property, and energies; and every child, therefore, was under public inspection from his birth, and was trained simply with reference to warlike exercises, since mechanical labour, husbandry, and commerce were despised and neglected. If weak or deformed, he was exposed to perish; otherwise, he was taken at seven years of age from his mother's care, and educated in the public classes, where he was subjected to the severest bodily discipline, to habits of subordination, dexterity, and a terseness of speech which became distinguished as "laconic." At the age of thirty he was allowed to engage in public affairs and to marry, but still continued under public discipline, took his meals at the public mess, slept in the public barracks, and was released from military service only in his sixtieth year. Both sexes were subjected to nearly the same rigorous gymnastic training, the aim being not domestic enjoyment or refinement, but the production of a hardy race of citizens. The great men that arose from this discipline were distinguished exclusively for military genius.

Under the Lycurgan constitution Sparta began its career of conquest. The first and second Messenian Wars (743-723 and 685-668, according to the common chronology) doubled its population and territory. Before 600 B.C. it had conquered from the Arcadians the upper parts of the valley of the Eurotas, and after repeated contests compelled Tegen, the capital of Arcadia, to acknowledge its supremacy (about 560). The long struggle between the Spartans and Argives terminated in favour of the former by decisive victories in 547 and 524. Sparta had now acquired the hegemony of Greece, and Croesus when threatened by the Persians had formed an alliance with it as the most powerful Greek state. It twice invaded Attica, and interfered in the affairs of the growing Athenian democracy. At the outbreak of the second Persian War, it was by unanimous consent intrusted with the chief command. The battles of Thermopylæ and Salamis in 480, and of Plataia in 479, were fought respectively under the Spartan generals Leonidas, Eurybiades, and Pausanias. According to Herodotus, the Lacedæmonians were represented at Plataia by 5000 citizens, 5000 *Perioikoi*, and 35,000 *helots*. The allies, excepting Ægina and the Peloponnesian states, were alienated by the arrogance of Pausanias, and therefore in 476 offered the supremacy to Athens. The hegemony thus passed from Sparta to Athens, and the rivalry of these states modified all the history of Greece till the Macedonian era. A destructive earthquake occasioned a revolt of the *helots* and the third Messenian War (464-455). The Spartans distrusted and rejected an auxiliary force sent by the Athenians under Kimôn, which was the cause of hostilities (457-452), the prelude to the long Peloponnesian War (431-404). This war, in which the opposed Doric and Ionic races exhausted their energies, terminated with the conquest of Athens and the restoration of the hegemony to Sparta. One of its allies was Cyrus the Younger, prince of Persia, and in return it aided him in his attempt to dethrone his brother Artaxerxes. The successes of Agesilaos in Asia Minor in 396 had led him to form the project of overthrowing the Persian Empire, when he was recalled by a confederacy of Corinth, Argos, Thebes, and Athens,

which Persian gold and Greek jealousy had prompted against Sparta. The victories of Corinth and Coronea were counterbalanced by the naval defeat off Cnidus, and the peace of Antalkidas (387), which left it supreme in Greece, deprived it of its cities in Asia Minor. The Spartans exerted unrivalled authority, notwithstanding the alliance of Thebes and Athens against it in 379, until, in the fatal battle of Leuktra in 371, they were defeated by the Thebans under Epaminondas, and, for the first time in their history, by inferior numbers. Invasion followed, Sparta narrowly escaped capture, its army was again defeated at Mantinea in 362, and it was stripped of the dominions which it had acquired from the Messenians, Arcadians, and Argives; and from this time it ceased to be a leading state in Greece. Having incurred the enmity of Philip of Macedon by supporting the Phocians in the Sacred War, its losses were confirmed and its power still further reduced by him; but it refused to join the alliance of Athens and Thebes against him before the battle of Chæronea, next to recognize his leadership in the proposed expedition against Persia, and subsequently to join the Achaian league against the Macedonian and Roman supremacy. It prompted an anti-Macedonian movement, which was defeated by the victory of Antipater at Megalopolis in 331. The kings Agis IV. (244-240) and Cleomenes III. (236-220) attempted to revive the ancient virtue by restoring the institutions of Lycurgus, abolishing the ephoralty, cancelling all debts, redistributing the lands, and enlarging the number of citizens by bringing back the exiles and bestowing the franchise on many of the *Periæci* and on others who were deserving of it; but the defeat of Sellasia (221) by the Achæans and the Macedonians under Antigonus Doson followed, and Sparta for the first time fell into the hands of conquerors. From intestine factions sprang the usurpations of Machanidas and Nabis (210-192), after which it was compelled with the whole of the Peloponnesos to submit to the Achaian League, until, in 146, it fell with the rest of Greece under the dominion of Rome.

SPARTACUS, a brave Thracian gladiator, famous as having for a time withstood the entire force of ancient Rome, was originally a shepherd, who came into conflict with the Roman legions, was taken prisoner and sent to Rome and sold to a trainer of gladiators. The year 73 B.C. found him at Capua, waiting for the games, with numbers of other gladiators. He was a born chief and leader of men, and a conspiracy was quickly organized under his guidance. At a given signal all who could broke bounds and made for the crater of Vesuvius. Vesuvius had been quiet for so many centuries that it was not recognized as a fire mountain. Its crater was a basin-shaped valley, all green with grassy slopes. The natural fortress thus provided served the turn of Spartacus well. About seventy gladiators escaped with him from Capua. As soon as camp was formed in Vesuvius crowds of slaves from all sides hastened to join. Caius Claudius Pulcher led three legions against this extraordinary foe, but had to give up the siege of the mountain, unable to stand against the skillfully organized sorties of Spartacus. Gradually the extent of these excursions increased until the bands of Spartacus ravaged the whole of Southern Italy, from Vesuvius onward. This state of things continued for two years, several armies were sent from Rome in vain, and both consuls were successively defeated. At one time Spartacus was at the head of 100,000 men, and was preparing to march to Rome. At last M. Licinius Crassus, the prætor, undertook the war in 72 B.C., and began by good generalship to make headway. Eventually he succeeded in driving Spartacus into the promontory of Rhegium, and although he escaped thence Crassus was able to bring on a general action near Brundisium, B.C. 71, in which Spartacus was slain. Through all the vilifying phrases of the Roman writers one can clearly see that in this gladiator chief lay the soul and

the genius of a true hero. He had wonderful control over the savage slaves whom he ruled, considering their wild natures; and what excesses are reported were manifestly committed, not by, but in spite of, his authority. He was very brave, and, like all truly brave men, humane.

SPARTEINE, an alkaloid obtained from the common broom (*Spartium scoparium*, natural order Leguminosæ). It is a heavy colourless oil, boiling at 288° C. (550° Fahr.). It is very bitter, and is a narcotic poison. The formula is $C_{15}H_{23}N_3$. It forms salts with acids, which are not generally crystalline. The chloroplatinate is a yellow crystalline powder, having the formula $C_{15}H_{23}N_3 \cdot 2HClPtCl_2 \cdot 2H_2O$.

SPARTIUM. See BROOM.

SPASMS (Gr. *spasmata*, from *spaō*, I draw out) are unhealthy, involuntary, and forcible contractions of muscular tissue. The term is almost synonymous with convulsions, but it generally implies less violence than the latter, and it is more generally applied than that word is to the unhealthy painful contractions of the heart, intestines, and involuntary muscles. Spasms are distinguished as *clonic*, in which the contractions and relaxations are alternate, as in chorea, epilepsy, and convulsive hysteria; and *tonic*, in which there is continued rigidity and hardness of muscle, as in cramp and tetanus. The medicines used to relieve spasm are termed ANTISPASMODICS, and they will be found described under that heading.

SPATHE, in botany, is the term applied to the large sheathing bract subtending the inflorescence of many plants. It is seen in the greatest perfection in the flowers of palms and aroids where, during the flowering of the plants, it embraces the entire inflorescence. In the aroids it is frequently petaloid and fulfils the function of the ordinary floral envelopes. In the palms it is of a leaf-like or even fibrous texture, forming a sheath to the large and much-branched inflorescence. The flowers of the narcissus, the snowdrop, and the iris are invested, in the early periods of their growth, with a membranous spathe which only incloses a single flower. In the onion and its allies the spathe is also membranous, and incloses the whole inflorescence.

SPEAKER, the name of the presiding authority in the House of Commons. In the Peers' House a similar office is filled by the lord chancellor or lord keeper of the Great Seal, and in his absence one or more deputy speakers, appointed by commission, take his place. Since 1851 only one has been elected, who is the chairman of the Lords' committee, but should he also be absent the House may nominate a Speaker *pro tempore*. The Speaker of the Lords may or may not vote on any question, may take part in the debates, and enjoys no special privileges.

In the House of Commons the Speaker is a personage of far more importance. He presides over all its deliberations, and upon him rests the responsibility of preserving order. He puts the questions, declares the will of the House, acts as its representative on all official occasions, conveys its thanks or its reprimands, issues warrants in execution of its orders for the commitment of offenders, regulates the issue of writs, and in virtue of his office takes precedence as the first commoner in the land. He is elected by his brother-members at the desire of the crown, which generally approves their choice. He is almost invariably elected from the political party which has a majority in the House, and his election is frequently treated as a trial of strength between the two great parties, but his own political sentiments are of little importance, as he cannot speak or vote on any occasion except when the voices happen to be equal. The title of Speaker was first given to Sir Thomas Hungerford, in the reign of Edward III.

In 1853 a deputy-speaker was appointed in the person of the chairman of the committee of ways and means, and in 1855 an Act of Parliament invested him, while acting for the Speaker, with all his authority and privileges. On

the Speaker's retirement he is raised to the House of Lords, with a retiring pension of £2000. His income, during his term of office, amounts to £5000 per annum, and he is provided with a residence suitable to his high position in the new palace at Westminster.

The Speakers since the union of Ireland have been—22nd January, 1801, Henry Addington (afterwards Viscount Sidmouth); 11th February, 1801, Sir John Mitford (afterwards Baron Redesdale); 10th February, 1802, Charles Abbot (afterwards Lord Colchester); 2nd June, 1817, Charles Manners Sutton (afterwards Viscount Canterbury); 19th February, 1835, James Abercromby (afterwards Baron Dunfermline); 27th May, 1839, Charles Shaw-Lefevre (afterwards Viscount Eversley); 30th April, 1857, John Evelyn Denison (afterwards Viscount Ossington); 9th February, 1872, Henry William Bouverie Brand (afterwards Lord Hampden); 1884, Arthur Wellesley Peel.

SPEAKING. In speaking the function of the larynx is to produce the sound only; the articulation is due to varying positions of the tongue, palate, lips, and teeth. Speaking is therefore by no means a variety of singing, but rather the converse. Many, indeed most good singers, are bad speakers while they are singing. All singing contains speech, save only that which consists of *solfeggi* or *vocalizzi*, and here, even, it is almost always the vowel *a* upon which the voice is produced. On the other hand speech differs from singing, so far as its sonant properties are concerned, chiefly by its rapid changes of musical pitch. A person calling loudly and exerting the voice gently, but steadily, almost always sings in speaking. But in usual speech the countless calls for variations of tone, due to accent, emphasis, and vowel sounds, cause such a rapid series of changes that no musical tone is perceptible. Hence the slowest speakers are the most musical. A tragedian who wishes to stir the depths of our nature uses a stately long-drawn utterance akin to an irregular melody in a minor key.

Speech is the most important division of LANGUAGE, and to that article the reader is referred. The varieties of articulate speech, vowels, liquids, and consonants are described in ALPHABET, and also under their own special articles.

SPEAKING-TRUMPET, an instrument for preventing the immediate dispersion of the waves of sound originated by the articulation of the human voice, and by the concentration thus obtained enabling conversation to be carried on with ease between persons at considerable distances from each other, more especially on shipboard. It appears to have been known to the ancient Chinese. Also, in a manuscript preserved in the Vatican, entitled "Secretum Secretorum" (erroneously ascribed to Aristotle), it is stated that Alexander "assembled his army by means of a great horn."

The modern speaking-trumpet appears to have been an invention of Sir Samuel Morland, who, in a pamphlet entitled "Tuba Stentoro-Phonica," describes the instrument as having been invented and experimented upon in the year 1670. It was of glass, 2 feet 8 inches long, and he afterwards made one of copper, recurved in the form of a common trumpet. Its total length was 16 feet 8 inches, the large end 19 inches, and the small end 2 inches in diameter. With this the voice was heard about $1\frac{1}{2}$ mile.

In 1678 Athanasius Kircher, in the preface to his "Phonurgia," claimed the invention of the speaking-trumpet for himself, and intimated that he had published a description of one several years before the appearance of Morland's pamphlet. His general unscrupulousness is notorious, and the present claim does not appear to be well supported. The efficiency of the speaking-trumpet is generally ascribed to the repeated reflection of the sound from side to side in passing through it, and its ultimate reflection from the mouth of the trumpet, in such a way as either to collect the rays of sound into a focus at a distance,

or to project them forward in parallel lines, instead of allowing them to diverge in all directions. The effect of a speaking-trumpet is the same whether the metal tube be used simply or wrapped round in such a way as to prevent vibration. It is also heard at the same distance whether or not the inner surface is lined with linen or woollen cloth to diminish reflection, and the range of a cylindrical trumpet is the same as that of a conical one. Many improved forms of this instrument have been introduced of late years. See TELEPHONE.

SPEARWORT is the popular name of two common British plants belonging to the genus *RANUNCULUS*. The Greater Spearwort (*Ranunculus lingua*) is a perennial herb, occurring in ditches and marshes in England and the south of Scotland; it is rather local in Ireland. It has a very fibrous root, an erect stem 2 or 3 feet high, lanceolate undivided leaves, and large handsome yellow flowers. It is a native of temperate Europe and Northern Asia. The Lesser Spearwort (*Ranunculus flammula*) is common in wet places in Britain, and is widely distributed in Europe and the northern parts of Asia, Africa, and America. It grows to a height of a foot or more, and has yellow flowers; the stem is sometimes procumbent and rooting.

SPECIE, a term used for gold and silver coin, in contradistinction to paper money. The term merely refers to the visible value of the coin, as against the artificial value of the paper.

SPECIES. This word is used in mathematics, or rather has been used, in two different senses. In the first place, by Euclid, who means by figures of the same species those which have the same form, whatever may be their size. Thus, in the Data, when the form of a figure is given, he designates it as given in species.

But the term was again used by Vieta in its logical sense, as opposed to individual, in designating the algebraical notation which he first distinctly proposed. Vieta borrowed the word to signify the use of letters to stand for numbers, when such letters were used to designate members generally, without reference to any one in particular. The logistics (a common term for the science of calculation) thus introduced he called species.

SPECIES, in biology, is a term used in a more restricted sense than in logic. What is the precise meaning of the word in this connection depends on the view taken of the great controversy on the "origin of species." The view that was almost universally prevalent till the latter half of the present century is expressed in the definition given by the great Swedish naturalist Linnæus—"Totidem numeramus species quot in principio formæ sunt creatæ" (We reckon as many species as there were forms created in the beginning). According to this view a species was a kind of animal or plant, differing in numberless respects from every other kind, which had remained distinct and unchanged since the original creation. According to the contrary doctrine, associated chiefly with the name of Darwin, a species, as such, has not, nor never had, any inherent ineradicable characters marking it off from other species. Every individual animal and plant varies, and such variations tend to be inherited. When individual animals and plants, known to be descended from a common parent, show a certain degree of difference between themselves they are grouped as *varieties*; when the variation has proceeded further and obtained a degree of permanence, the intermediate links between the groups having dropped out, these groups obtain the rank of *species*. A variety is, then, a nascent species, and a species a far-gone variety, and the distinction between the terms is arbitrary and made for the sake of convenience. The foregoing is an outline of the foundation of Darwin's famous "origin of species," which is expounded at greater length in the article *EVOLUTION* in the present work. According to the latter theory the notion of the creation of species

vanishes. One of the great objections to Darwin's theory is what is often given as a physiological definition of species, namely, that the animals or plants of one species are generally infertile, or but imperfectly fertile, with those of another species; but, as the sterility is by no means absolute, the definition fails as a definition, while other considerations, which need not here be considered, are advanced to invalidate the objections thus raised.

A modification of the current theory on the origin of species, recently put forward by Dr. Romanes (*Journal. Linnean Society*, July, 1886), has excited much attention among naturalists. According to this view, which Dr. Romanes calls *Physiological Selection*, natural varieties originate chiefly by individual variations in the degree of fertility with the parent form—that is to say, a degree of infertility is a cause rather than a consequence of specific distinction. The physiological variety having arisen, it is kept distinct from the parent form, and the swamping effects of intercrossing being removed, it will "tend to increase its morphological distance from the parent form until it eventually becomes a true species."

SPECIES DALER (*Riksdaler species*) was the former unit of value in Norway. It contained five orts, or 120 skilling, and was worth 4s. 5½d.

SPECIFIC GRAVITY, or more properly *Specific Weight*, is a term used to express the weight of any body, under some given volume, as a cubic foot, a cubic inch, &c. Distilled water is the substance usually employed for the purpose of comparing together the weights of all substances except the gases; and because the volume of every substance varies with its temperature, in determining from experiment the specific gravity of any substance, the weight under a given volume is related to that which it would assume at one constant temperature.

In the Parliamentary Regulations, which were made in 1825, a cubic inch of water is stated to weigh 252·456 troy grains, the temperature being 62° Fahr., and the height of the barometrical column, 30 inches; and 7000 troy grains are made equivalent to 1 lb. avoirdupois; hence it follows that a cubic foot of water should weigh 997·136 ounces.

On the Continent, since the employment of the decimal scale of weights and measures has become general, the cubic centimetre (·061028 cubic inch English) is the unit of volume, and the gramme (15·43248 troy grains) is the unit of weight; the gramme having been determined by the weight of a cubic centimetre of distilled water of the temperature at which its density is a maximum (39·2° Fahr.)

To find the specific gravity of a liquid—the simplest case—we take a very light glass flask (fig. 1), of such capacity that when filled up to a mark on the neck it may contain exactly 500 or 1000 grains of pure distilled water at 60° Fahr. This bottle, previously counterpoised, is carefully filled with the liquid in question to the exact height, and is then weighed. The specific gravity required is then found by the following proportion:— $1000 : a :: 1'00 : x$; a denotes here the weight of the liquid found, and x the specific gravity sought.

For technological purposes the specific gravity of fluids may be determined with sufficient accuracy by means of the *HYDROMETER*. In case of solids the body is first weighed in the ordinary manner, in a balance which can indicate the one-thousandth of a grain (fig. 2). It is next suspended by

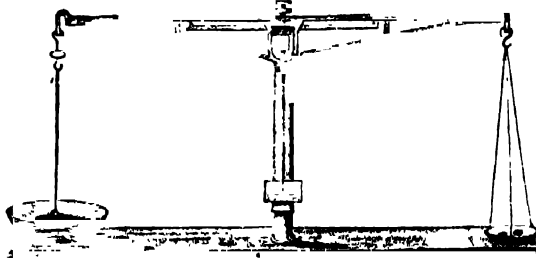


Fig. 1.

Specific Gravity Bottle.

a hair from one balance pan so as to hang in a vessel of pure water at 60° Fahr., and weighed again. Subtract the weight in water from the weight in air, and divide this last weight by the difference. The quotient is the specific

Fig. 2.



gravity sought. Strictly speaking, the absolute weight of the body should first be found by weighing in a vacuum. A variety of minute precautions are required for determining the specific gravity of a solid with scientific accuracy. Thus all air-bubbles which may cling to the substance on immersion in the water must be removed with the point of a fine needle.

If the body is lighter than water and would float, it is first weighed in air as above, and attached to a piece of metal heavy enough to sink it, and suspended from the balance. The whole is then carefully weighed, immersed in water, and weighed again. The difference between the two weighings gives the weight of a quantity of water equal to both together in volume. The light body is then taken off, and the piece of metal alone is weighed, first in air and then in water. The following example will make the calculations intelligible:—

Light body (e.g. piece of cork) in air weighs	39.6
Fastened to a piece of brass the whole weighs	519.6
Immersed in water the whole weighs	294.1
Weight of water equal in bulk to brass and cork.	225.5

Weight of brass in air,	480
" of brass in water,	422
of equal bulk of water,	

Bulk of water equal to cork and brass,	225.5
" " equal to brass alone,	58
" " equal to cork alone,	167.5

$$\text{Weight of cork, divided by } \left. \begin{array}{l} \text{of equal bulk of water} \end{array} \right\} = \frac{39.6}{167.5} = 0.236$$

0.236 is therefore the specific gravity of cork.

If the substance in question is in small fragments, or in powder, we take the specific gravity bottle used for liquids. A suitable amount of the body is now carefully weighed out and introduced into the bottle, which is next filled up to the mark with distilled water at 60° Fahr. and weighed.

Suppose the bottle holds water,	1000
The body introduced,	190
Weight of the whole if no water had been displaced,	1100
The observed weight is,	1070

Water displaced,
Here $\frac{190}{70} = 2.71$, specific gravity required.

If the substance is dissolved or decomposed by water, some other liquid of known specific gravity is used in its place, which is found to have no such action. Alcohol, mineral naphtha, or pure oil of turpentine is generally used. Thus, in case of sugar:—First, find the specific gravity of oil of turpentine = 0.87; weigh the sugar in the air, then in the oil. The difference is, of course, the weight of an equal bulk of the latter.

Weight in air,	400
" in oil,	182.5
" of equal bulk of oil,	217.5

$0.87 : 100 = 217.5 : 250$ —i.e. the weight of an equal bulk of water; then $\frac{250}{190} = 1.31$, specific gravity of the sugar. In some cases the substances are varnished to protect them.

In estimating the specific gravity of gases the unit employed is either atmospheric air or, more frequently, a stated volume of hydrogen (the lightest known substance) at 0° C., and a barometric pressure of 76 centimetres of mercury. The specific gravity of a gas is therefore the number which indicates how many times heavier it is than an equal amount of air or of hydrogen, according to the standard used, under the same conditions of temperature and pressure.

For the sake of comparison the specific gravity of a few substances is given below.

Specific gravity of some solids as compared with distilled water at 40° Fahr.

Cork,	0.210	Sapphire,	3.990
Wood (beech),	0.852	Ruby,	4.280
Ice,	0.920	Zinc,	7.146
Coal (Wallsend),	1.330	Iron (cast),	7.210
Alum,	1.700	Tin,	7.292
Anthracite,	1.800	Steel,	7.810
Aluminium,	2.670	Copper,	8.950
Emerald,	2.700	Bismuth,	9.799
Granite,	2.700	Silver,	10.530
Glass (flint),	3.330	Lead,	11.360
Diamond,	3.500	Gold,	19.340

Specific gravity of some liquids under the same conditions, except where specified.

Ammonia, liquid,	0.780
Alcohol (at 32° Fahr.),	0.815
Oil, almond or olive (at 60° Fahr.),	0.918
Oil, cod-liver,	0.928
Water, distilled,	1.000
rain,	1.001
sea,	1.026
Beer,	about 1.030
Wine,	up to 1.088
Tar,	1.150
Hydrochloric acid, liquid,	1.270
Nitric acid (at 60° Fahr.),	1.517
Sulphuric acid,	1.848
Mercury (at 32° Fahr.),	13.596

Specific gravity of some gases compared with air.

Hydrogen,	0.069	Oxygen,	1.105
Coal-gas,	0.500	Phosphuretted h'gen,	1.185
Steam,	0.622	Hydrochloric acid,	1.254
Carbonic oxide,	0.967	Nitrous oxide,	1.527
Nitrogen,	0.971	Carbonic acid,	1.529
Air,	1.000	Chlorine,	8.440

SPECIFIC HEAT. Different bodies require unlike quantities of heat to produce in them an equal rise of temperature, and, on the other hand, in cooling through the same number of degrees they disengage unequal quantities of heat. This may be shown in a striking manner by

warming small spheres of iron, tin, and bismuth to the same temperature, and then placing them on a cake of wax. The iron will sink deeply, the tin to about half its diameter, the bismuth scarcely at all. This different capacity for heat in bodies is called *specific heat* when they are compared with regard to weight, and *relative heat* when compared with regard to volume. The specific gravity multiplied by the specific heat gives the relative heat.

When bodies of different temperatures and different capacities for heat are mixed, the temperature of the mixture will not be the mean between the temperature of the ingredients. Equal weights of bodies equally heated or cooled, and differing in their capacity for heat, raise or lower the temperature of a determinate measure of water through different numbers of degrees.

TABLES OF SPECIFIC HEATS.

Specific heat of 1 lb. of water=1.

Gases and Vapours.	Equal Weights heated under Constant Pressure.	Equal Volumes heated under Constant Pressure.
Air,	0.2375	0.2375
Carbonic oxide, . . .	0.2450	0.2370
Hydrogen,	3.4090	0.2359
Nitrogen,	0.2438	0.2368
Oxygen,	0.2175	0.2405
Water vapour,	0.1805	0.2989

Liquids and Solids.

Water,	1.0000
Ice,	0.5040
Alcohol,	0.0620
Antimony,	0.0513
Arsenic,	0.0822
Bismuth,	0.0308
Bromine,	0.0813
Charcoal (pure), . . .	0.2415
Cobalt,	0.1067
Copper,	0.0939
Diamond,	0.1468
Gold,	0.0324
Iodine,	0.0511
Iron,	0.1138
Lead,	0.0314
Mercury,	0.0333
Nickel,	0.1092
Petroleum,	0.4684
Phosphorus,	0.1900
Platinum,	0.0324
Silver,	0.0570
Sulphur,	0.1780
Tin,	0.0562
Zinc,	0.0955

It is noticeable that water has a higher specific heat than any other substance in the tables. It will at once strike the reader that this must give to water an enormous power in steadying the variations of climate, and, in fact, the benedict action of the sea in that regard cannot be overrated. As regards water also it is to be noticed that its specific heat is double that of ice and more than double that of steam (equal volumes under equal pressure); and in general a substance possesses usually a higher specific heat as a liquid than as a solid or as a gas.

The capacity of any body for heat increases with its temperature. Those metals whose rate of expansion increases most rapidly when heated increase most in specific heat. Petit and Dulong have deduced from their experiments the law that the specific heats of bodies vary inversely as their atomic weights, so that an atom of any given simple substance has the same capacity for heat. In

most substances the product of the specific heat into the atomic weight is nearly 3.2.

The specific heat of a compound is diminished by increasing its density; thus peroxide of iron has its specific heat lessened after violent ignition. Dimorphism appears to exert no distinct influence upon specific heat. See also HEAT, section *Calorimeter*.

SPECTACLES are glass lenses so mounted in frames as to be conveniently retained before the eyes in order to assist defective vision. It has been conceived, though with very little foundation, that spectacles were in use among the ancients; but most authorities give the latter part of the thirteenth century as the period of their invention. The mention of magnifying glasses by Roger Bacon, who died about 1292, justifies the supposition that something like what are now called spectacles were in use at least several years earlier. Extensively as these useful instruments are employed, there can be no doubt that, were the subject more generally understood, the amount of advantage obtained from them would be greatly augmented. The eyes of an individual whose sight is much tried often receive the most serious injury from improper delay in the use of spectacles; while the sight of many persons is prematurely worn out by the use of glasses of too high a power or too short a focal length. The use of a single reading-glass instead of spectacles is very injurious, since, by occasioning one eye to be more used than the other, the focal lengths of the two are rendered unequal. The unsteadiness of the glass is also a disadvantage.

Divided spectacles, each glass consisting of two half-lenses, are sometimes used, the upper half of each glass being occupied by a concave lens or one of very slight concavity, for seeing distant objects, while the lower half has a strong magnifier, for examining things near the eye. The late astronomer-royal found that one of his eyes refracted the rays of light to a nearer focus when in the vertical than when in the horizontal plane; and this defect he succeeded in remedying by using a double concave lens, the one surface of which was spherical and the other cylindrical.

From what has been stated above it is evident that much care and judgment are required in the choice of spectacles. The specious name of *Preservers* has been given to convex glasses of about 36 inches focus; and many persons have entertained an opinion that such spectacles have the property of arresting the progress of that natural change by which most individuals become long-sighted as they become older, but it is almost needless to say that such an opinion is entirely without foundation. The only spectacles to which the wearer can with propriety apply the name are those which, of whatever power they may be, are exactly suited to his particular case. Such spectacles, although they cannot stop the natural changes of the eye, may greatly diminish their inconvenience, and even retard their progress.

SPECTATOR, THE, a very justly famous periodical publication, following and quite eclipsing the *Tatler*. It excluded politics, and dealt by means of brief essays, lightly and elegantly written, with manners, literature, religion, &c. Steele was its founder and nominal head, but Addison had in reality as much to do with it. Its first number appeared 1st March, 1711, and its last (No. 555) 6th December, 1712. Addison revived it by himself (June to December, 1714), but was unable to carry it on long. The price was at first a penny, and it was issued daily. In August, 1712, a halfpenny stamp was levied on all papers, and seriously injured the *Spectator*, which raised its price to twopence. Many journals were killed outright; and no doubt it was this severe check, rather than natural decay, which led Steele and Addison to break up the journal in the December following.

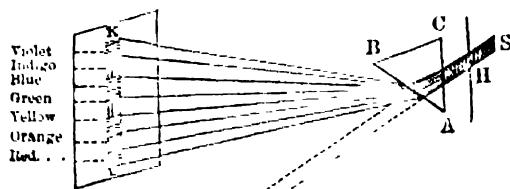
The charming humour of Steele's "Sir Roger de Coverley,"

a creation in which Addison also took part; the earnest little sermons Addison was fond of preaching on a Saturday, and the high, critical, and literary excellence of the whole work have earned for the *Spectator* a permanent place on our shelves, and a lasting influence on our literature.

SPECTROSCOPE. See SPECTRUM ANALYSIS.

SPECTRUM. See LIGHT.

SPECTRUM ANALYSIS, a mode of ascertaining the chemical composition of bodies by means of the light they emit or absorb when in a gaseous state. The optical instrument by which the composition of light can be ascertained is called the spectro-scope. The principle of this instrument depends upon a remarkable property of the refraction of light. When a ray of light enters a refracting medium the direction of the ray is altered [see LIGHT], but the angle through which the ray is bent depends upon



its colour. Advantage is taken of this property of a refracting medium by means of a prism, and the contrivances adapted to utilize the prism constitute a spectro-scope.

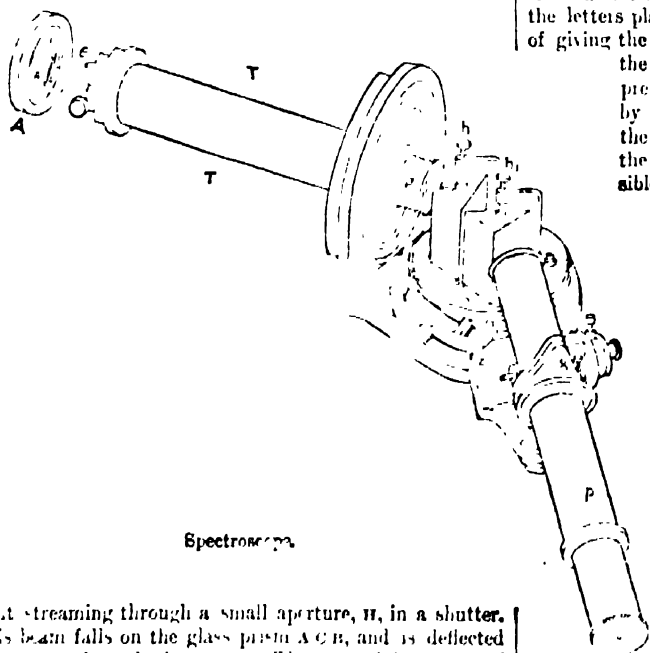
In the above figure, *s* represents a beam of sun-

The spot of light is thus stretched out by the prism, and we have on the screen *K* a band of beautiful colours, forming what is known as the solar spectrum. The arrangement used for accurate observations is shown in the preceding figure, which represents one of the modern forms of spectro-scope used in astronomical researches. *TT* is really a small telescope, whose object-glass is at *g*, and focus at *e*. A slit in a screw is placed at *e*, admitting a thin band of light. We shall suppose for a moment that the light is of a single colour, and a divergent beam of that colour falls on the object-glass at *g*. The effect of the object-glass is to render the rays emanating from each point parallel, and thus a parallel beam falls on the prism *h*, and then on the prism *h'*; the effect of these prisms is to deflect the beams to such an extent that they then fall on the object-glass of the second telescope, *r*, and are brought to a focus so as to be visible through the eyepiece. By this arrangement each hue in the original beam carries a distinct image of the slit to be reproduced in the eyepiece. Many spectroscopes have a third tube, which carries at one end a transparent scale, illuminated by a lamp or candle, and at the other a lens, whose focal length is the length of the tube. This tube is so placed that the light passing through the scale falls on the second surface of the last prism, and part of it is then reflected. By adjusting the tube this reflected light can be brought into the field of view of the telescope, and the image of the scale is seen as in fig. 1 of our Plate. The position of any given line or band in the spectrum can then be ascertained by the scale. If the light be like ordinary sunlight, where the different hues blend into each other by insensible gradations, then the view through the eyepiece shows a continuous spectrum. When, however, the spectro-scope has been carefully adjusted with a fine slit, the solar spectrum is seen to be not continuous, but shaded over with a vast multitude of dark lines. The Fraunhofer lines, as they are called (some of which are shown in fig. 1 of the Plate), are perfectly constant and definite in position, and are usually indicated by the letters placed beneath the figure, and they are capable of giving the most interesting information with regard to

the constitution of the sun, when properly interpreted. These lines are now known to be produced by the presence of certain gases or vapours in the atmosphere surrounding the sun, and from the position and the grouping of the lines it is possible to discover what those substances are. We

must, in the first place, have a series of spectra for comparison, which correspond to the various elementary bodies. In our Plate we have depicted the spectra seen when the incandescent vapours of the elements potassium, rubidium, caesium, thallium, indium, sodium, lithium, calcium, strontium, and barium, are placed in front of the spectro-scope. Suppose, for instance, the light from the flame of a spirit lamp, of which the wick has been impregnated with common salt (chloride of sodium), be examined by the spectro-scope. This light does not expand into a long coloured band like the solar spectrum; the light emitted from the sodium flame is almost entirely concentrated into two brilliant yellow lines, known as the *D* lines, from the letter used to indicate

their position. The spectrum of sodium is seen at fig. 7 on the Plate. Similarly the spectrum of strontium (*Sr*), fig. 10, which is shown when the red flame produced by strontia is viewed through the spectro-scope, consists of a certain very characteristic group of red lines.



light streaming through a small aperture, *u*, in a shutter. This beam falls on the glass prism *A C N*, and is deflected by passage through the prism. The original beam was of course of white light, and if it had not been diverted by the prism would have gone to form a white spot at *P*. This white light is really due to a mixture of the seven primary colours, red, orange, yellow, green, blue, indigo, and violet. Each of these colours is bent differently by the prism; the red is the least bent, the violet the most.

Other substances, such as oxygen, &c., produce spectra of greater complexity. The spectra of the metals can be studied by bringing before the slit of the spectroscopic electric arc, the poles of which are formed by the metal under consideration; while the spectra of incandescent gases, such as hydrogen or nitrogen, are examined by passing the current from a Ruhmkorff coil through a glass tube containing a small quantity of the gas in a highly rarefied condition. If the electric discharge takes place through a compound gas or vapour, the spectra produced are those of the elementary constituents of the gas. It will be observed that the lines in the solar spectrum (fig. 1 of Plate) are *dark*, while those produced by the incandescent elementary substances are *bright*. One of the most interesting of modern discoveries is that which teaches us the connection between the dark lines of the sun and the bright lines appropriate to the elements. Let us, for example, take the case of sodium, which exhibits the phenomenon in question more readily than any other element. It had long been known that in the solar spectrum was a pair of dark lines, called the D lines, very close together in the yellow. It was found that these lines were in the identical position occupied by the two bright-yellow lines arising from the flame of sodium. This coincidence would be utterly inexplicable unless some physical connection were detected between the light reaching us from the sun and the flame of incandescent sodium. The great discovery to which we have referred explains this connection. It is shown that the vapour of sodium, when incandescent, always emits rays of precisely the same refrangibility as the rays which sodium vapour is capable of absorbing. In this lies the explanation of the phenomenon. Around the sun is a vast atmosphere containing, among other ingredients, a quantity of sodium vapour. The light from the incandescent materials underneath has to stream through this atmosphere, and the sodium vapour, while allowing to all other rays an uninterrupted passage, seizes on and absorbs all the rays which ought to fill up the gaps in the solar spectrum due to the two D lines. Similarly other substances in the sun's atmosphere intercept other groups of lines. Iron, for instance, is the source of some hundreds of dark lines in the solar spectrum; and thus, by comparison of the sun's spectrum with the spectra of terrestrial substances, it was found that many of the most common elements of the earth abound in the sun's atmosphere as well.

In place of a prism or set of prisms a spectrum may be produced by means of a grating, which is generally a glass plate ruled with a great number of fine parallel lines by means of a diamond, or a photographic reduction on glass of ruled lines. Gratings have been produced containing as many as 43,000 lines to the inch. The spectrum produced when a ray passing through a fine slit is intercepted by such a grating, is due to **DIFFRACTION** and **INTERFERENCE**. Such spectra are not more than one-tenth as bright as those produced by a prism; but, on the other hand, the colours in them are uniformly distributed in their true order and extent, according to the difference of their wave-lengths, and according therefore to a property inherent in light itself, while in prismatic spectra the red rays are less dispersed than those at the violet end. Diffraction spectra have the advantage of giving a far larger number of dark lines (in the solar spectrum), and of giving them in their exact relative positions, and they also extend further in the direction of the ultra violet. Their use in spectroscopic research is accordingly extending.

The same principle has been successfully applied to the qualitative analysis of terrestrial substances, and in the hands of the analytical chemist the process has proved of great value.

SPECULAR IRON ORE, a crystalline variety of *Ilæmatite*, having a highly metallic lustre and curious

iridescent appearance. It is mostly found in crystalline or metamorphic rocks, though occasionally among the products of recent volcanoes, and it forms one of the most valuable ores of iron, being free from sulphur and phosphorus. It is widely distributed, but appears to be particularly abundant in the Isle of Elba, where it has been worked since the days of the ancient Romans.

SPECULUM, a name frequently given to a mirror used for any scientific purpose, as in a reflecting telescope.

If a pencil of rays diverge from a radiant point in the axis of a concave speculum of a spherical form, all the rays will, after reflexion, converge nearly to a certain point in the same axis at which the image of the radiant point is said to be formed. This point is called the focus. None of the rays are, in strictness, reflected to the focus, but all those which are reflected from the mirror at points very near its intersection with the axis fall extremely near it.

All the rays proceeding from the radiant point pass through an imaginary circle, called the circle of least aberration, and the distance of the centre of this circle, measured on the axis, from the focus towards the mirror, is expressed by

$$\frac{3}{4} \frac{w^2 Y^2}{r} \left(\frac{1}{r} - \frac{1}{u} \right)^2.$$

in which *Y* is the length of the circular arc by whose revolution about the axis the concave surface of the mirror is supposed to be formed; and this is three-fourths of the longitudinal aberration of an extreme ray of the pencil.

The image in a convex mirror is always upright; and in a concave one always inverted, except when the object falls between the principal focus (middle point of the radius) and the mirror. As a matter of fact, however, the parabola, and not the circle, is the usual form for specula. Their perfection consists in large surface, whereby they collect the greatest quantity of light; in the highest possible polish, whereby it is reflected with least loss; and in the most exact parabolic curvature, rendering the image distinct and precise. In a speculum of 6 feet diameter, a variation even at its edge from the true parabolic curvature, so minute as to escape detection with any except the most refined means of measurement, may render the whole useless. The metallic alloy best adapted for the requirements of specula was first employed for this purpose by Sir Isaac Newton, and is similar to that used by the ancient Egyptians for mirrors. It consisted chiefly of copper and tin, and in essentials is that still in use; but by the modification of details and proportions, great improvements have been lately introduced into its manufacture.

SPECULUM METAL, a white metallic alloy employed in making the specula of astronomical telescopes. It contains copper and tin, with a little arsenic.

SPEECH, PARTS OF. See **PARTS OF SPEECH**.

SPEEDWELL (*Veronica*) is a genus of plants belonging to the order **SCROPHULARIACEÆ**. The species are numerous, distributed throughout the temperate and colder parts of the world, a few extending into the tropics. They are herbs or shrubs with the leaves opposite, rarely whorled, and small (usually blue) flowers in axillary or terminal spikes or racemes. The calyx is four-, rarely five-parted; the corolla has a very short tube, and a wheel-shaped, deeply four-lobed limb, the lower segment the narrowest; the stamens are two, and the capsule is flattened. About seventeen species are British. The Common Speedwell (*Veronica officinalis*) is found throughout Britain, in woods and dry pastures; it is a native also of Europe and North-western and Central Asia, and has been naturalized in North America. It has a much branched creeping stem, the branches growing to a height of a foot or more, oval leaves, toothed and hairy, and slender racemes of small pale blue or lilac flowers. The Germander Speedwell

(*Veronica Chamædrys*), one of the most beautiful of our wild flowers, is found in abundance throughout Britain, in fields, pastures, banks, &c. It flowers in May and June, the flowers being large, deep blue, in axillary racemes. The Water Speedwell (*Veronica anagallis*) is found in ditches and along streams and ponds in Britain; it has axillary racemes of pale blue flowers. Brooklime Speedwell (*Veronica Beccabunga*), also found in wet places in Britain, has rather thick leaves, and small bright, blue or pink flowers. The Spiked Speedwell (*Veronica spicata*), a beautiful species with dense terminal spikes of blue flowers, is rare in Britain, found chiefly in Cambridgeshire and Suffolk, but is often cultivated in gardens. *Veronica saxatilis* and *Veronica alpina* are two alpine species found in Britain, on the highest mountains of Scotland; the former has very beautiful, large, bright blue flowers. The number and beauty of the speedwells lend a charm to the woods, hedgerows, and waysides in summer and autumn. Many of the foreign species are cultivated as ornamental plants in gardens; and some of the New Zealand Limby kinds form handsome greenhouse plants. Some of the species were much used by the old herbalists as medicine; the leaves of the brooklime were prescribed as an anti-scorbutic decoction, and those of the common veronica were infused as tea and put taken of as a refreshing beverage, equal, as some of the physicians of former days said, to the true tea itself.

SPEETON CLAY, a series of clayey deposits, about 500 feet thick, exposed beneath the chalk in the cliffs near Flamborough Head, Yorkshire. The formation is so-called from the locality where it is most typically developed, and contains numerous marine fossils, which prove it to represent the lower cretaceous NIOGOMIAN series of the Continent. Professor Judd has recognized three divisions of the Speeton clay—an upper, middle, and lower—which differ in their contained fossils, and seem to correspond with the three groups of Neocomian strata met with in Switzerland. In addition to ammonites, other cephalopods, and brachiopods, &c., these beds have also yielded bones of reptiles.

SPEKE, CAPTAIN JOHN HANNING, a distinguished African traveller, was born near Ilminster, Somersetshire, in 1823. He received a good education, but evincing a strong predilection for the career of arms, entered the East India Company's service at a very early age. He distinguished himself in the Punjab campaigns by his gallantry and steadiness, and was rapidly promoted. At the close of the war his love of adventure prompted him to undertake a journey of exploration in Central Africa, and he first visited the country with that design in 1851. Four years later he set out in conjunction with Captain Richard Burton, under the auspices of the Royal Geographical Society, on a mission of exploration which had in view the survey of the great equatorial lake or lakes conjectured to exist in the vicinity of the supposed sources of the Nile. They failed in the chief object of their enterprise, as described in Captain Burton's book, "The Lake Regions of Central Africa," but discovered the immense lake known as the Victoria Nyanza. Speke had the sagacity to perceive that this inland sea was in all probability the source of the Nile, and to verify his supposition he entered upon another African journey, in company with Captain Grant, in 1859. On this occasion Captain Speke made some interesting observations in reference to the resources and peoples of the wild countries which he traversed, and ascertained that the Victoria was actually a source, and one of the principal sources, of the great Egyptian river. [See NILE.] He returned to England in 1862, and was received with the welcome due to a brave, intrepid, and sagacious traveller. He gave to the world the result of his discoveries in a "Journal of the Discovery of the Source of the Nile" (1863). He was also the author of a preliminary record,

entitled "What led to the Discovery of the Nile Source." Captain Speke was accidentally killed by the discharge of his own gun while out shooting, on the 15th of September, 1864. Speke's conclusions as to the Victoria Nyanza being the real and long-sought source of the Nile were afterwards amply confirmed by Mr. Stanley and others.

SPELLING ought to present no difficulty in any well-constructed language; and in Italian at the present day there is, as a matter of fact, but very little difficulty. As shown in the articles on PHONETIC WRITING and PRONUNCIATION, however, English has become an extremely difficult tongue in this respect, and many schemes have been propounded to reform spelling. All these schemes, from those which involve new letters (because, as shown in the article PHONOLOGY, twenty-six letters are not enough) to those which make the old ones do, under certain conventions, meet with an enormous initial obstacle. The fact is that grave differences of pronunciation exist, some people following the spelling, others the pronunciation, in the numerous cases where the letters have changed their value. Thus, the word "merchant," once pronounced *marchant*, is now pronounced universally *murchant*; and in consequence the words "clerk" (pron. *clark*), "Derby" (pron. *Darby*), "Hertford," &c., are beginning to be called *clurk*, *Durby*, *Hurtford*, &c., by those not moving in literary circles. But though a truly phonetic spelling would quickly bring out crowds of unsuspected differences in speech, it would at the same time exert a strong influence for good upon pronunciation. Books by the best authors, phonetically written, would be taken as models by the less educated readers, and their speech would be rapidly refined in consequence.

There are objections to spelling reform, as there are to all reforms. But the German nation has taken its spelling in hand vigorously, and the Italians long since reformed theirs with great success. The objections cannot therefore be deemed insuperable. The chief of them are as follows:

1. That our libraries would be rendered useless. But the reform is sure to be gradual, and certainly is not so great as the change from black letters to Roman letters, nor is it comparable to the change from MS. to printing.
2. That it would be laborious to grown persons to learn what would be a new language. This objection needs no refutation by any one who has tried to write phonetically, and who has found the extreme ease with which it is grasped.
3. That our associations would be broken, and the continuity of our literature destroyed. But no one, even to-day, reads Spenser, Shakespeare, or the Bible in the original spelling, except for linguistic purposes.
4. That the continuity of our language would be destroyed and valuable etymological records would vanish. This is really a very great objection, and cannot entirely be removed. The gain to philology would, however, outweigh the loss. If Englishmen had always spelt phonetically, the history of the language would be far clearer than it is; and it is a fact that the more eminent a philologist of the present day, the more ardent an advocate of spelling reform is he.

The extension of the English race is an additional argument for reform. If English is made an easy language it will speedily become the language of the world. And, moreover, the moral effect of such a change would be not small. It must work much mischief in a child's brain to be forced to spend years upon an illogical system which perpetually destroys the healthy tendency to reason by analogy, and to make every particle of knowledge gained a helpful step towards gaining a fresh particle. Whereas when a child has learned to spell *child* "child," it has obtained no help towards the spelling of *chivalry* or *Kristmas*; nor does "bough" help it with *throe*, *koff*, *enuf*, &c.; though the first all begin with *ch* and the second all end

with *ough*. Not so with its studies in arithmetic or in any other science or art, save orthography alone; each step is a step forward.

Since Hare and Thirlwall published their translation of Niebuhr's "History" in 1831, we have made great strides. Then the outcry against their "sovrain, forein, stretch," and the like, was so great that Bishop Thirlwall in his "History of Greece" (1835) resumed the ordinary spelling with a contemptuous acknowledgment of the force of prejudice. Several leading philologists now use the reformed spelling recommended as a first step by the English Spelling Reform Association, the chief rules in which are as follows:—

1. Omit *a* from *ea* when sounded as in *hed, helth, or in herse*.

2. Omit *e* when fonetically useless, as in *harth, har, gie, definit, raind*.

3. Omit one or double consonants also when fonetically useless, as *apear, skind, dipt, shal, wil, clif*.

4. Change *ph* to *f* when so sounded, as in *alfabet, fantom, fotograf*.

5. Change *y* (vowel) to *i* except when final or followed by *i*, as *sistem, fisic, pitying*.

6. Change *ed* to *t* (and after a short vowel or a consonant, *ced* to *st*) when so sounded, as *fixt, practist, prononist*.

7. Change *of* to *or*; and *z* to *s* in distinctiv words, as *use* (n.) *uce* (v.)

8. Change final *ce* to *se* after a consonant, and to *s* after a short vowel; as *defense, pierse, practis*.

Americans now invariably spell "travelling," &c., without doubling the *l*; "pretense, defense," &c., with *se* instead of *ce*; "honor, favor," &c., with *or* instead of *our*; as well as adopting some other reforms with less unanimity.

Even such a reform as this would reduce by nearly two-thirds the time taken to teach children to read and spell. An Italian child is found by accurate observation to learn these arts in little over a third of the time needed by the superior brain of the English child; and further the Italian boy can proceed to read unknown words, whereas the English boy can never venture beyond the words he has absolutely learnt without imminent risk of failure. This saving in money and time has to be taken seriously into account.

SPELT (*Triticum spelta*), or German Wheat, is an inferior grain plant, grown in France and Flanders. See **WHEAT**.

SPENCER, EARL. John Charles Spencer, a distinguished English statesman, best remembered as Viscount Althorp, was the eldest son of the second Earl Spencer, and was born on 30th May, 1782. He was educated at Harrow, whence he removed to Trinity College, Cambridge, where he took the honourable degree of M.A. in 1802.

In 1804 he entered the House of Commons as member for Okehampton. On the formation of the Whig ministry of Mr. Fox and Lord Grenville, 11th February, 1806, in which his father, Earl Spencer, took office as secretary of state for the home department, Lord Althorp was appointed one of the junior lords of the Treasury. He of course lost his seat at the Treasury board when the Grenville administration was dissolved in March, 1807, nor did he again hold office till the accession of Lord Grey and his friends to power in November, 1830. During all this interval, although he did not appear in debate so frequently as some other members, he was regarded as one of the steadiest supporters of the Opposition in the House of Commons. He was prominent for several years in a series of attacks upon the financial policy of the Tory administration, and his house was the resort of a powerful section of the Whig party, who considered him their chief.

On the accession to power of the Grey administration in November, 1830, Lord Althorp was appointed chancellor

of the exchequer. His position, and the universal confidence in his integrity, made him the ministerial leader in the House of Commons. No man, probably, had ever filled the post who possessed less of the gift of oratory, but his clearheadedness and sound sense were considered amply to make up for that deficiency. This opinion was justified by the manner in which the Reform Bill and the Poor Law Amendment Bill were carried through the House—the task in both cases falling principally upon his lordship. The death of Earl Spencer, 10th November, 1834, which occasioned the removal of Lord Althorp to the Upper House, led to the downfall of the ministry. When the administration of Sir Robert Peel and the Duke of Wellington, which succeeded, was obliged to resign in April following, and the Whigs came again into power under the premiership of Lord Melbourne, Earl Spencer as well as Lord Brougham was left out of the new cabinet. It was understood that he declined to take office again. He died at his seat of Wiseton Hall, in Nottinghamshire, 1st October, 1845.

SPENCER, HERBERT, the greatest English philosopher of the nineteenth century, was born in Derby, 27th April, 1820. His father was a teacher. Herbert was fond of keeping insects and watching their transformations, and for years the finding and rearing of caterpillars, the catching and preserving of winged insects and making drawings of them, were his regular occupations. He also assisted his father in philosophical experiments. At the age of thirteen he was sent to study with his uncle, the Rev. Thomas Spencer, rector of the parish of Hinton. Here he remained three years, and made special progress in mathematics. Returning home, he studied perspective with his father, on the principle of independent discovery, the successive problems being put in such order that he was enabled to find out the solutions himself. This was a favourite mode of teaching with his father, who is the author of a valuable little work entitled "Inventional Geometry" on this plan. At sixteen Herbert devised a new and ingenious theorem in descriptive geometry, which was published with the demonstration in the *Civil Engineers' and Architects' Journal*. At seventeen he accepted an engagement under Charles (afterwards Sir Charles) Fox as a civil engineer, and began work on the London and Birmingham Railway. In 1841 he declined a further appointment, returned home, and spent two years in mathematical and miscellaneous studies. He made a botanical press and an herbarium, and practised drawing and modelling. All the time he had in progress some scheme of invention, improvements in watchmaking, machinery for the manufacture of type by compression of the metal instead of casting, a new form of printing press, and the application of electrotypes to engraving, afterwards known as the glyptograph. In the spring of 1843 he went to London in quest of literary occupation, but did not succeed, and resumed engineering. His earliest literary contributions were made to the *Civil Engineers' and Architects' Journal*, the *Philosophical Magazine*, the *Zoist*, and the *Nonconformist*. In the last-named journal, in 1842, he began the publication of a series of papers on the "Proper Sphere of Government," which were issued in a pamphlet in 1843. From 1848 to 1852 he was a regular writer for the *Economist*, the *Westminster Review*, and the *Edinburgh*. At the house of Mr. Chapman, editor of the *Westminster*, Spencer met George Eliot and Mr. George Lewes, and a lifelong friendship sprang up. In fact, at the time, as her letters show, George Eliot was more closely tied by friendship to Spencer than to Lewes, who was later on to become her consort. The elaborate papers which he contributed to these various reviews were pervaded with the idea, since more distinctly developed, known as the doctrine of evolution. He soon became a firm believer that all organized beings have arisen by development. In

1554 he first conceived of evolution as a universal process, and later he came to the conclusion that it must become the basis of any system of philosophy which represents and conforms to the general method of nature. In 1560 he published a prospectus of such a system, and immediately entered upon its execution. He had already collected his essays upon the scientific aspects of social questions, and had published various volumes leading up to his system. Most of these were revised and enlarged in subsequent editions to present more fully his new philosophy. The fourth division of his system, devoted to sociology, deals with the science of human society from the point of view of evolution expounded and applied to the general phenomena of life and mind in his earlier volumes. In furtherance of this department of his work, he for several years employed the aid of three assistants in collecting and classifying facts pertaining to all types of society, savage tribes, decayed races, and existing civilizations, which, under the title of "Descriptive Sociology," form a series of folio volumes. The following is a list of his chief publications: "Social Statics, or the Conditions Essential to Human Happiness specified, and the first of them developed" (London, 1851); "Principles of Psychology" (London, 1855; revised edition, two vols., 1870-72); "Railway Morals and Railway Policy" (London, 1855); "Essays" (1857, 1863, 1868, 1871, &c.); "Education, Intellectual, Moral, and Physical" (London, 1861); "First Principles of a System of Philosophy" (London, 1862); "Classification of the Sciences," to which is added "Reasons for dissenting from the Philosophy of M. Comte" (London, 1864); "Principles of Biology" (two vols., London, 1864); "Spontaneous Generation, and the Hypothesis of Physiological Units" (1870); "Recent Discussions in Science, Philosophy, and Morals" (1871); "The Study of Sociology" (London, 1872); "Descriptive Sociology: Facts Classified and Arranged" (first three vols., folio, London, 1873); and "The Principles of Sociology." The "Principles of Sociology" was published as a fresh book in 1879, and "Cereemonial Institutions," 1879, "Political Institutions," 1882, and "Ecclesiastical Institutions," 1885, which are respectively Parts IV., V., and VI. of the "Principles of Sociology," followed at the dates given. The valuable work, "The Data of Ethics," appeared in 1879.

SPENSER, EDMUND, a distinguished English poet, was born in London, 1552. Of his father's circumstances we know nothing; but it is clear that, in spite of the different spelling of the name, he was connected with the Spencers of Althorp, the ancestors of the Spencers and Churchills of our time. "The nobility of the Spencers," says Gibbon, "has been illustrated and enriched by the trophies of Marlborough, but I exhort them to consider the 'Faerie Queen' as the most precious jewel of their coronet." The poet was educated at the Merchant Taylors' School and at Penbroke Hall, Cambridge, where he was admitted as a sizar in 1569. He took his M.A. degree in 1576, when he left Cambridge to reside in the north of England, where he wrote poetry and corresponded with his friend Harvey.

In 1579 we find Spenser in London, just emerging from obscurity by the publication of the "Shepherd's Calendar," a work which marks a turning point in the history of English poetry. It consists of twelve eclogues, differing in subject, mode, and character, but assigned to the twelve months of the year. Sir Philip Sidney, to whom this work was dedicated, appears to have warmly patronized the poet. In 1580 the "Four Epistles" which passed between Spenser and Gabriel Harvey appeared. The subjects were an earthquake which happened at that time in London, and satirical poetry. Spenser is addressed under the name of "Immerito." In the same year he was sent to Ireland as secretary to Lord Grey of Wilton by the Earl of Leicester, Sir Philip Sidney's uncle. His services pro-

duced him in 1586 a grant from the crown of 3028 acres of land, called Kileolman, in the county of Cork, forfeited by the Earl of Desmond. But he now lost his kind friend and patron, a mournful event which he commemorated in his beautiful pastoral elegy of "Astrophel," not published until 1595.

During his residence at Kileolman the "Faerie Queen" was most probably begun. In 1590 the first three books appeared. In 1591 "Colin Clout's come Home again" was published. This poem is dedicated to Sir Walter Raleigh, who appears to have become, after Sidney's death, the poet's principal friend, and is generally believed to have introduced him to Queen Elizabeth. In 1591 were also published a collection of minor poems, entitled "Complaints," and the second part of the "Faerie Queen." The six books which completed the work are stated to have been lost in their passage from Ireland by the carelessness of Spenser's servant, but this is denied by Fenton the poet. Two "Cantos of Mutability," which were first published in the collection of 1609, appear to be all that remain to us of the missing poems.

In 1594 he married, and the great wedding ode which he wrote on the occasion, the "Epithalamion," is a poem of remarkable beauty. In 1596 he published four "Hymns," addressed to the Countess of Cumberland and Warwick, in which the Platonic doctrine of beauty is expounded in noble verse; also a ditty called "Diplomata." In the same year he wrote "A View of the Present State of Ireland," published by Sir James Ware in 1633. His "Prothalamion," a nuptial poem, appeared about this time.

The close of the poet's career was lamentable. Tyrone's rebellion broke out in 1598. Ben Jonson related to Drummond of Hawthornden that "the Irish having robbed Spenser's goods and burned his house and a little child new-born, he and his wife escaped; and after he *died for lack of bread* in King Street, and refused twenty pieces sent to him by my Lord of Essex, adding 'He was *sorrow* he had no time to spend them.' " He certainly died on 16th January, 1598-99, in King Street, Westminster, though, let us hope, for the honour of his numerous friends, in no such extreme poverty. He was buried, at his own request, near Chaucer, in Westminster Abbey.

Spenser has been called "the poet's poet," and it is this, perhaps, more than his hold on the average literary student which gives him enduring fame. Notwithstanding the moral worth of the "Faerie Queen," its lessons of manliness and nobleness, its value, moreover, as a work of art, its fertility and richness of imagination, it is clear that to poets alone, and not to the vast mass of lovers of poetry, has the work given perennial pleasure. The opinion of the multitude is, perhaps, best expressed by Lord Macaulay when he says, "Very few and very weary are those who are in at the death of the Blatant Beast. If the last six books, which are said to have been destroyed, had been preserved we doubt whether any heart less stout than that of a commentator would have held out to the end." On the other hand Shakespeare and Milton praised Spenser generously. Dryden and Pope acknowledged his influence. Tennyson has shown full often how much he owes to him, and Wordsworth has expressed his enthusiasm in imperishable lines:—

"Books, we know,
Are a substantial world, both pure and good:
Round these, with tendrils strong as flesh and blood,
Our pastime and our happiness will grow;
There find I personal themes, a plenteous store,
Matter wherein right voluble I am,
To which I listen with a ready ear;
Two shall be named, pre-eminently dear,—
The gentle lady married to the Moor;
And heavenly Una with her milk-white lamb."

There are many editions of Spenser's poems. That in the Globe Library, edited by Richard Morris, is distin-

quished by a scholarly introduction by J. W. Hales. George L. Craik's "Spenser and his Poetry" is a kind of "royal road" to the study of the "Faerie Queene." The most satisfactory biography is that by Dean Church in Macmillan's Men of Letters Series.

SPERGULA. See **SPEYER**.

Sperm Whale (Physeteridae) is a family of aquatic mammals belonging to the order Cetacea. The sperm whales differ from the true or Greenland whales in having teeth and not baleen plates; the teeth are conical and slightly curved, found in the lower jaw only, from twenty to thirty on each side, and fitting, when the mouth is shut, into cavities in the upper jaw, which has only rudimentary teeth concealed in the gums. There is a small fin on the hind part of the back. The flippers are very short and situated near the angle of the mouth. The head is of enormous proportions, one-third the whole length of the body, nearly cylindrical and truncated in front. The skull is comparatively small, the greater part of the bulk of the head being made up of a cartilaginous envelope or "case" containing the valuable substance known as spermaceti. The blow-hole is single, somewhat *f*-shaped, and placed in the anterior margin of the snout.

The Common Sperm Whale or Cachalot (*Physeter macrocephalus*) is one of the largest and most important of the whale tribe. It attains a size varying from 40 to 70 feet, the females being only half as long. In colour it is blackish above, becoming lighter on the sides and whitish below. The sperm whale is found in all seas, but chiefly in those of the southern hemisphere; it lives in deep water and very rarely approaches the land. It is gregarious, being usually seen in companies of from a dozen to fifty or sixty. The sperm whale feeds chiefly on cuttle-fishes, but probably also to some extent on fishes and other marine animals. It remains on the surface of the water for ten or fifteen minutes, making a great number of respirations in that time, the "blowing" or "spouting" taking place with great regularity; the males can remain below for an hour or more, but the female and young ascend to the surface at more frequent intervals. The usual rate of travelling is 1 or 5 miles an hour. The worst enemies of the sperm whale, other than man, are the Grampus or Killer Whale (*Orca gladiator*) and the Fox Shark (*Alopias vulpes*).

The sperm whale is eagerly hunted; for from it are obtained three substances valued in commerce, sperm oil, spermaceti, and ambergris. The oil is obtained by boiling the fat or "blubber;" a single whale will yield from seventy to ninety or even one hundred barrels of oil, which is very valuable and superior to train oil, the produce of the Greenland whale. Spermaceti is an oily fluid, of which about a ton is found in the whale's head; when purified it is highly valued for medicinal purposes and for making candles. Ambergris is more valuable than the spermaceti; it is a morbid secretion of the intestines, and forms an important drug. The sperm whales are pursued in boats and harpooned; when killed they are usually towed to the ship, where the blubber and spermaceti are extracted. This whale, though naturally timid, is more dangerous than the Greenland whale, for while its tail is equally powerful, it can crush a boat in its mouth or stave in a ship's side with its snout. The sperm whale fishery is now chiefly carried on in the Southern Ocean, off the coasts of Australia, New Zealand, &c., in the Japanese and Chinese Seas, and off the coasts of Peru, Chili, California. Of late years it has rarely been seen in the Atlantic. The British sperm whale fishery, at one time encouraged by government bounties, is now almost entirely abandoned, and in America and other parts of the world the fishery has also declined.

The Short-headed Sperm Whale (*Kogia breviceps*) is a much smaller species, measuring only from 6 to 10 feet in length. The body resembles that of a porpoise in general appearance, and has a well-marked dorsal fin and a short

broad head. It has been taken at the Cape and off the coasts of India and Australia.

SPEY, a river in Scotland, rising near the south-east base of Corryarrick, 10 miles south of Fort Augustus, in the south-west of the county of Inverness, flows nearly due north and then north-east, separating for a considerable distance the counties of Elgin and Banff, and after a course of about 95 miles, falls into the Moray Firth at Garmouth. It is celebrated for its romantic scenery, and has valuable salmon fisheries. The area of its basin is about 1285 square miles.

SPEYER. See **SPIRES**.

SPEZIA, LA, a town of North Italy, in the province and 50 miles south-east of the city of Genoa. It is at the north-west extremity of the gulf of Spezia (ancient *Portus Lunæ*), which is one of the largest and finest harbours in the world, surrounded by lofty mountains and containing within itself many minor ports. Spezia contains the principal naval arsenal of Italy, and has gun factories, magazines, depots, and hospitals. The population is about 31,000. The chief products of the district around the town are olive oil and wines.

SPHÆRALA'CEÆ is a genus of plants belonging to the order MALVACEÆ. The species are trees or shrubs. The flowers are of a reddish or flesh colour. With the exception of one, which is a native of the Cape of Good Hope, the species are all found in South America. They all of them bear elegant flowers, and will thrive well in gardens in this country. *Spha. calacea Cisplatina* (the Cisplatine globe-mallow) is a native of Brazil, in the western part of the Cisplatine province. It is used medicinally in Brazil in the same manner as marsh-mallows are in Europe. The decoction is given in inflammations of the bowels, and it is also employed as a fomentation in diseases of the chest.

SPHAGNA'CEÆ is a tribe of Mosses (Musci). There is only one genus, *Sphagnum*, containing the bog-mosses, which are all aquatic in habit, found on the surface of watery turfy bogs throughout the colder and temperate parts of the world. The dense masses of vegetation which the bog-mosses form in these districts are generally filled with water, so that they will not bear the weight of a human being upon them; and from this cause many animals have lost their lives, being deceived by the apparent firmness this moss gives to a mass of water. When the bog-moss has grown long enough in a lake or bog, its decaying leaves and stems form peat, which is used as fuel. *Sphagnum* is put to various uses by gardeners, especially for covering the roots of plants which have to be sent a considerable distance before being planted, and is also used in the cultivation of epiphytall orchids in the greenhouse. In arctic countries the bog-mosses afford food to the reindeer, and even to man, but they contain very little nutriment.

The bog-mosses differ from the true mosses (Bryaceæ) by forming on germination a branching flat frond-like protonema, on which the leaf-buds appear. The leafy stems produce root-hairs in the young state, which subsequently completely disappear. The leaves consist of narrow elongated cells containing chlorophyll and of large empty porous cells with their walls strengthened by a spiral thread. The archegonia and antheridia arise on the fasciated branches, always on distinct branches, and sometimes on distinct plants. The antheridia are globose, stalked bodies. The sporogonium is a globose capsule seated on a short stalk (pseudopodium), opening by an operculum; and the calyptra, which surrounded the growing sporogonium, is ruptured irregularly.

SPHEG'IDÆ. See **SAND-WASP**.

SPHEN'ODON is a remarkable genus of REPTILES, allied to the LIZARDS (Lacertilia), but usually considered sufficiently distinct to form a separate order, Rhynoccephalia. The Tuatara (*Sphenodon* or *Hatteria punctatus*) is a large sluggish lizard-like reptile, native of New Zealand, where

it appears now to be verging on extinction. According to Diellenbach, who described it in 1813, the Sphenodon was then very scarce, as the natives killed it for food. It is a large reptile with four limbs, a large head, and large eyes, and a crest of white flat sharp spines. It appears to prey on insects and small birds. The skull of the Sphenodon is very remarkable. The quadrate bone is immovably united to the skull, and there is a completely osseous lower zygomatic arcade, as in the crocodiles. The premaxillæ are separate, and form a sort of beak, their large teeth becoming completely fused with the bones supporting them. Along the palatine bones is a row of teeth running parallel with those on the maxillæ, the teeth of the lower jaw being received into the groove between the palatine and maxillary teeth. In some other respects the skeleton of the Sphenodon is peculiar. The bodies of the vertebræ are flat at both ends (biconcave). There is a peculiar abdominal sternum with well-developed ribs. The limbs resemble those of lizards. The extinct reptiles of the Triassic Age, Rhynchosaurus and Hyperodapedon, appear to have been closely allied to Sphenodon.

SPHERE or **GLOBE**, a solid body, the surface of which is everywhere equally distant from a given point or centre within it. This distance of each point from the centre is called the radius.

A section made by a sphere and plane is always a *Circle*. A section passing through the centre is called a *Great Circle*, and one which does not pass through the centre a *Small Circle*.

The centre of a circular section is found by drawing a perpendicular from the centre of the sphere to the plane of the section. All sections whose planes are parallel have their centres on one straight line, namely, the perpendicular to the plane which passes through the centre of the sphere. This straight line is called the *Axis* of the circles, and its extremities on the sphere are called the *Poles* of the circles. The great circle is called the *Primary* and all the others *Parallels*; while great circles passing through the axis of a primary are called *Secondaries*.

By the angle made by two great circles is always understood the angle made by their planes, which is also made by their tangents at the point of intersection, and that made by the intersections of the two circles with the third circle, to which both are secondary. It is also the angle made by the axes of the two circles.

The angle made by two straight lines drawn from the centre is often confounded with the arc which that angle marks out on the sphere. When this causes any confusion, which it will sometimes do at first, instead of each arc mentioned read its angle; thus for the arc AB read "angle subtended by the arc AB." Thus when we say that the angle made by two great circles is the arc intercepted between their poles, we mean not to equate the angle to the length of an arc, but to the angle which that arc subtends at the centre.

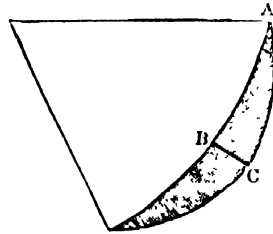
DOCTRINE OF THE SPHERE.—This phrase is generally used to signify the application of the simple geometrical notions concerning the sphere to geography and astronomy. In geography the end is almost gained when a distinct notion is acquired of the meaning of the terms "terrestrial latitude" and "terrestrial longitude," generally abbreviated into "latitude" and "longitude."

There are few problems of much interest connected with geography merely; and it must be remembered that the common terrestrial globe, with its brazen secondary to the equator (called a meridian, very incorrectly, except as meaning that it *may be made* a meridian to any place), its ecliptic, and figured horizon, is almost as much a representative of the sphere of the heavens as of the earth; and the most useful problems are those in which the sphere is used conjointly in these capacities.

The celestial sphere is a fiction, derived from the im-

possibility of distinguishing the distances of the heavenly bodies, on which account they all seem at the same distances of a sphere so great that the earth, its centre, is but a point in comparison. But it must be remembered that the appearances of the heavenly bodies conform themselves to this fiction, so that the development of the consequences of the latter amounts to an explanation of the phenomena of the heavens. The "doctrine of the sphere" is really a part of every work on astronomy.

SPHERICS or **SPHERICAL TRIGONOMETRY.** These are names given to the application of trigonometry to the investigation of the relations which exist between the sides and angles of triangles drawn on a sphere.



By a spherical triangle is meant that portion of the sphere which is cut off by three arcs of great circles, each of which cuts the other two, as A B C.

SPHEROID, a name given to the class of surfaces which are formed by the revolution of an ellipse about either its longest or shortest diameter. When the longer diameter is the axis, the spheroid is called *prolate*; when the shorter, *oblate*. The earth is an oblate spheroid, or



Prolate Spheroid.



Sphere.

very near indeed to such a figure, its axis of revolution from pole to pole being several miles shorter than its equatorial diameter; hence the oblate spheroid is of much more importance in mathematics than the prolate spheroid.

SPHEROIDAL STATE OF LIQUIDS. Although liquids usually accommodate themselves precisely to the form of any vessel containing them, and are therefore often considered to have no proper shape, they have, nevertheless, a tendency when properly isolated, so that gravitation can exert itself freely, to assume a spheroidal shape. This can be shown in two ways.

First, let a bottle with a narrow neck be partly filled with a saturated solution of sulphate of zinc, then if a little coloured bisulphide of carbon be gently introduced so that it floats on the zinc solution, and afterwards some water to cover the bisulphide, the latter will be seen to collect in the form of a flattened spheroid, probably rather wider than the neck of the bottle in its long diameter.

Secondly, if a metal plate be heated to redness, and water be dropped carefully on it, the water will not flow over the plate as it would do in the cool state, but will become spheroidal and rapidly rotate as a spheroid on the plate, frequently showing a beautifully crinkled or waved outline, probably produced by secondary rotatory move-

ment within the drops. Directly the plate begins to cool the drop can no longer remain spheroidal; it sinks on to the plate and is driven into steam. Thus a copper bottle made very hot over a spirit flame may have a little hot water dropped into it and yet not drive it into steam, so that a cork may be lightly pushed into the neck; but when the bottle is removed from the flame and begins to cool, the water touches the hot metal, flies into steam, and drives the cork out with violence.

In both cases the liquids are spheroidal because they have been artificially kept from adhering to the surface above which they lie. The bisulphide rolls on the zinc solution without mixing, the water rotates and dances above the hot plate without touching it; consequently these liquids take their natural position, just as they would do in absolute space. The remarkable puzzle in the second instance is that liquids cannot touch a very hot plate. It is easy to see that they do not touch by looking at a flame across the surface of such a plate, when the light is clearly seen between the hot plate and the spheroidal drop dancing above it. Many results follow from this. First, the spheroidal liquid is not very hot, because it only receives heat by radiation, not connection, and therefore absorbs but little heat. Liquids are heated rather by connection than in any other way, and therefore so long as they do not touch the hot plate they remain comparatively cool. But the plate, on the contrary, must be very hot to drive the liquid into a spheroidal state. The lowest temperature for water is 200°C . (392°Fahr .), and for alcohol 131°C . (273°Fahr .) This extraordinary contrast of temperature enables physicists to freeze water in a red hot crucible. For if a mixture of solid carbonic acid and ether be thrown into a red hot crucible it assumes the spheroidal condition, and because it receives heat but slowly in that state it retains its very low temperature long enough to freeze a little water carefully added. The temperature of the carbonic acid is ascertained to be 11°C . below zero (12°Fahr .) in this experiment. In like way the hand if dipped first in water so as to be well moistened all over, may be plunged into molten lead with impunity, for the hand is protected by a comparatively cool glove of spheroidal water. No doubt the monks who in old times used the ordeal by red hot metals relied upon similar knowledge for their success.

The usual explanation, which is provisionally accepted, failing more complete knowledge, is that in the beginning the under surface of the falling liquid is so instantaneously vaporized on first approaching the hot plate that the drop when formed is supported on a cushion of its own vapour, and that as fast as this escapes from beneath it new vapour is supplied. When the plate sinks to such a temperature that vaporization is not instantaneous, then the liquid comes into contact with it, and is at once raised to boiling point, and wholly driven off in vapour.

SPHERULITES are minute rounded concretions occurring in glassy igneous rocks, *e.g.* ONSIDIAN. These interesting bodies are usually of a deep yellowish-brown colour, having a more or less radiate structure, and often inclosing numerous opaque particles, which are perhaps magnetite. They are produced by molecular changes in the rock, and have sometimes been observed in artificial plate-glass that has been acted upon by flames.

SPHINCTER (Gr. *sphiggo*, pronounced *sphingo*, to bind tightly), a name applied generally to the muscles which close the external apertures of organs, as the sphincter of the mouth, of the eyes, &c., and more particularly to those among them which, like the *sphincter ani*, have the peculiarity of being, during health, in a state of permanent contraction independently of the will, and of relaxing only when it is required that the contents of the organs which they close should be evacuated.

SPHIN'GIDÆ. See HAWK MOTHS.

SPHINX, a fabulous being which occurs in the mythology of Egypt and India, and also in the mythology and art of the Greeks. Greek sphinxes, as we know partly from the descriptions of the ancients, and partly from representations, were portrayed in different ways, but the figure was always a compound of the animal and human forms. The human part seems invariably to have been represented as female. The sphinx appears on various works of art, and also on some coins.

The Egyptian sphinxes have the body of a lion, and are represented in the same recumbent position as those of the Greeks; the upper part of the body is either human, and generally female, or it has the head of a ram. These sphinxes were usually placed so as to form a long avenue leading to a temple. The Great Sphinx at Gizeh, near the pyramids, which is hewn out of the rock, is 172 feet 6 inches in length, and 100 feet in height in front. The space immediately in front of the breast was very anciently converted into a small naos, or sanctuary, dedicated to the sphinx by Thothmes III. and Ramses II. A granite altar was found in 1816 between its fore paws, of coarse Roman workmanship, and probably used by the Romans for sacrificial purposes. The Great Sphinx has several times been cleared more or less perfectly; but the ever-drifting sands of the desert soon cover it up to a greater or less height.

The last occasion but one on which the Great Sphinx was cleared down to the level on which the paws rest was in honour of the opening of the Suez Canal in 1869. The sands had, however, reburied it almost to the throat when Professor Maspero, during his last year of office at Bonlak, began again the work of disinterment towards the close of 1885. A tramway was laid down from the sphinx to the edge of the pyramid plateau, passing close under the west face of the granite building popularly, though incorrectly, called the Temple of the Sphinx. Along this tramway light trucks conveyed the sand to the point at which their contents were discharged, the trucks being loaded by Arabs of both sexes and all ages, who carried the sand upon their heads in large flat baskets, ascending and descending all day long from the excavations below to the tramway above, and *vice versa*. In a little over a year the entire fore part of the great stone monster was laid bare, and the huge chest, the paws, the space between the paws, the altar in front of them, and the platform upon which they rest, were once more open to the light of day. Between the sphinx and the edge of the pyramid plateau a vast space was also cleared, bringing to view a fine flight of steps some 40 feet in width, described by Pliny, actually uncovered by Cavigha (in 1817), but entirely lost to sight for nearly seventy years.

To the right of the sphinx a further excavation shows that the sphinx once stood in the midst of a huge artificial amphitheatre hewn out of the solid rock. The whole work is admittedly the oldest monument in Egypt.

From the level of the area below the great flight of steps (which lead down, and not up, to the sphinx) one could measure, in 1887, the whole height of the huge human-headed monster, whose battered countenance stood out against the cloudless sky 100 feet above. The space between the paws is 35 feet long and 10 feet wide. This space was anciently converted into a small sanctuary lined with votive tablets, only one of which—the famous stela of Thothmes IV.—yet remains *in situ*. This stela records how the king, when upon one of his hunting expeditions, lay down to rest at midday in the shadow of the sphinx. He there fell asleep, and dreamed a dream in which the venerable image conjured him to clear away the sand in which it was nearly buried. Then the prince awoke and “made silence in his heart,” and vowed to do that which the god had commanded. The lower part of this tablet is obliterated, and Mr. W. M. Flinders Petrie, who visited the spot in January, 1887, found that an important part

of the fourteenth line, containing the name of Khafra (Chephren), had sealed off since the first time the inscription was copied. The tablet stands 14 feet high, and is cut from a block of the same red granite of Syênê whereof the neighbouring temple of Khafra is built. There seems, according to Mr. Petrie's report, to be very good reason for concluding that the pious Thothmes, desiring to record his respect for the memory of Khafra, actually pilfered this very block for the purpose from Khafra's own temple, for on the back of it there are two pivot holes, or rather "holes

for letting in pivot blocks," precisely similar to the pivot holes which are to be seen in the lintel-stones and door-sills of that building. The Roman granite altar between the paws is of the same syenite, and most probably came from the same convenient quarry.

Avenues of sphinxes have been discovered at Saggarah and at Kanak, leading up to great temples. There are several small sphinxes in the British Museum. Sphinxes are also met with in India as ornaments of temples, but they are always represented with the head of a man. The



The Great Sphinx at Gizeh.

word, which is Greek, signifies the Strangler or Squeezed. The famous sphinx of Thebes, in the Greek mythology, squeezed and crushed her victims to death, having pounced upon them from the rock where she lay in wait for them and tried them with her horrible riddles in mockery. Hence the name in Greek. For the legend of the sphinx and Oedipus (Œdipus) see OEDIPUS. In the Egyptian hieroglyphs the sphinx bears the name of *Neb* or Lord, and *A Kar* or Wisdom, and it probably symbolized the power of intellect or intellectual force.

SPHINX BABOON (*Cynocephalus sphinx*) is a large species of BABOON inhabiting Guinea. It has black hair tinged with dark greenish; the callosities are blood-red. It resembles the cachina greatly in appearance and habits, and is sometimes seen in zoological collections. When young it is playful, but becomes fierce and morose as old age comes on.

SPHYGMOGRAPH (Gr., pulse-writer), an instrument used in modern medical practice to record the movements of the arterial pulse. [See PULSE.] The chief use of the sphygmograph is found in the diagnosing of certain diseases of the heart.

SPHYRÆNIDÆ is a family of fishes belonging to the order ACANTHOPTERYGII. There is only one genus, *Sphyræna*, characterized by an elongated, subcylindrical body, covered with small scales; the jaws are armed with strong teeth; the cleft of the mouth is large; the lower jaw is produced beyond the upper, terminating in a sharp point; the dorsal fins are two, small and distant; the ventrals are placed on the abdomen a little behind the pectorals. There are 8 feet and a weight of 40 lbs., and preferring the vicinity of the shore, where they are dangerous to bathers. The seventeen species from tropical and subtropical seas. They are large carnivorous fishes, attaining the length of best known species of this family is *Sphyræna vulgaris*, not uncommon in the Atlantic and Mediterranean, a silvery-coloured fish, with a bluish back, which shines as if covered with metallic lustre. The famous *essence d'orient*, used in the manufacture of artificial pearls, is sometimes prepared from the scales and air bladder of the common *Sphyræna*. The most remarkable species is the Barracuda (*Sphyræna barracuda*), an inhabitant of the West Indian seas. At certain seasons its flesh, which at other times is good and wholesome, becomes highly poisonous. When

partaken of at such seasons it produces trembling and violent nausea, pains in the head, in the arm-joints, and in the hands. If much is eaten the hair and nails fall off, and the sufferer presents all the symptoms associated with deadly stomach poisons. If put for a season in salt it is said to lose its poisonous qualities.

SPICE ISLANDS. See MOLLUSCA ISLES.

SPIDER-CRAB is the name given to several species of CRAB (*Brachyura*), distinguished by the great length of their legs and by the shape of the carapace, which is more or less triangular, narrow in front, with a prominent beak. The spider-crabs, in spite of their long legs, are not very active, but most of them have their carapace so covered with corallines or seaweeds that they can approach their prey without being perceived. The Common Spider-crab (*Maja spinado*) is found on our southern coasts, and is one of the largest British crabs, the carapace measuring from 4 to 8 inches long, and the fore limbs sometimes as much as 15 inches. The carapace is very convex and somewhat oval in shape, growing more triangular with age by the lengthening of the beak; its whole surface is beset with strong spines and tubercles. The antennae are small. This, or a nearly allied species, is found along the coasts of Western Europe and in the Mediterranean. It is eaten by the poorer classes, but is not much esteemed for food. The Four-horned Spider-crab (*Pisa tetradon*) inhabits the Mediterranean, and is taken on the south coast of England. The carapace of this species is triangular and elongated in front, beset with tubercles and armed along its margins with spines; the two spines above the eyes are very strong and form, with the two strong horns of the beak, the four horns referred to in the popular name. The fore pair of limbs are very strong and thick in the adult male, but in the female they are small and shorter than the second pair. Both carapace and limbs are thickly covered with short hairs. This small species live concealed among the seaweeds covering the rocks, and very frequently has its own body thickly covered with growing seaweeds. It is often taken in crab and lobster-pots. The Slender-beaked Spider-crab (*Stenorhynchus tenuirostris*) is a very pretty little crab, remarkable for its very long legs, small slender body and elongated beak, equalling the carapace in length. It is taken on our southern coasts. One of the most curious British species is the Long-legged Spider-crab (*Stenorhynchus phalangium*), found on most of our coasts. It has a triangular carapace and very long slender legs, both often covered with seaweeds. It is very slow and sluggish in its movements, and is preyed on by many fishes, especially the thornback ray. There are many other British species of spider-crabs belonging to the genera *Inachus*, *Acheus*, *Hyas*, &c.

SPIDER-MONKEY. See ATRETS.

SPIDERS (Araneida) is an order of the class ARACHNIDA. The body of a spider is divided into an unsegmented cephalothorax and a swollen abdomen, also unsegmented and attached to the former by a narrow stalk. The cephalothorax is covered above by a more or less horny plate or carapace, while the abdomen is generally soft. The whole body is more or less covered with hairs, bristles, or tubercles. There are four pairs of seven-jointed walking limbs attached to the cephalothorax, which are usually long and slender, and end in two claws, to which one or more claws are sometimes added. Above these is another pair of appendages, the pedipalpi, answering to the maxillae of insects; their bases act as jaws, and their palpi are five-jointed and in the female resemble simple legs, but in the male their terminal joint is peculiarly modified as a copulatory organ. Above the mouth is the first pair of appendages, the palces or chelicerae, which consist of two joints, a powerful basal joint grooved on its inner surface, and a claw-shaped terminal joint, or fang, at the point of which the duct of a poison-gland opens. These fangs, whose office it is to

catch and kill the prey, are, when not in use, folded back into the groove of the basal joint. The basal joint has generally a row of teeth on one or both edges of the groove, and assists in eating, moving usually from side to side. On the front margin of the cephalothorax are usually eight, sometimes six or less, simple eyes. The abdomen is always larger and more swollen in the female. On its ventral surface in front are one or two pairs of respiratory apertures, and between them the unpaired genital aperture. The anus is placed at the extremity of the abdomen on the ventral surface, and is surrounded by two or three pairs of spinnerets.

The mouth opens into a short oesophagus with horny walls, which terminates in a dilated radiating sacral stomach, from which are given off four or five pairs of caeca running into the legs; the intestine is narrow, and opens into a short dilated rectum, which receives a pair of much-branched urinary or Malpighian canals. Salivary glands open into the anterior portion of the oesophagus. The liver is very large and much branched, opening into the intestine.

The vascular system is well developed. The blood is colourless. The heart is a chambered dorsal vessel situated in the abdomen, from which an aorta runs forward into the cephalothorax, giving off lateral arteries to the legs, jaws, brain, and eyes. In the fore part of the cephalothorax these arteries reunite, surrounding the brain and forming the abdominal aorta, which runs backwards into the abdomen. The blood, after making its way through the tissues and bathing the lung sacs, re-enters the heart by three pairs of lateral valves.

Respiration is effected partly by apertures, composed of a number of delicate tracheae, and partly by tracheae or air-tubes. There are one or two pairs of lung-sacs situated in the anterior portion of the abdomen, and opening by slit-like stigmata. The tracheae open by a pair of stigmata further down, sometimes quite at the extremity of the abdomen.

The nervous system is concentrated into a cerebral ganglion or brain, and a large ganglionic mass situated in the thorax and supplying nerves to the legs and abdomen.

The spiders possess an apparatus for the production of a viscid fluid, which has the property of hardening on silk on exposure to the air. This consists of numerous glands pouring their secretion through fine pores on to the surface of the spinnerets, which are from two to four pairs of conical papillae placed behind the anus; the apex of these spinnerets is surrounded by stiff bristles and hairs, and is dotted with numerous horny tubes through the pores at the end of which the secretion escapes in threads of extreme fineness, thousands of which are united to form a single strong thread as used in the web.

The spiders are all oviparous, and a single impregnation is sufficient for several successive generations. The eggs are numerous, and are usually inclosed by the female in a silken bag which she carries about with her or hides in her nest, or in some cases attaches to stones, plants, &c. The young, when hatched, resemble their parents in form, but they cannot spin nor capture prey till after the first moult.

Spiders are found in every habitable portion of the globe, but are larger and more abundant in warm climates. The males and females live separately, and the latter are most frequently seen and are considerably the larger. All are carnivorous, devouring living prey, chiefly insects and other arthropods, sucking the juices and sometimes swallowing the fragments; the females are generally ready to attack and feed on the males, even in the reproductive season, and both sexes are fond of fighting, the vanquished being devoured. They can support long fasts, and remain torpid during the winter. In making their webs they accom-

moderate themselves remarkably to circumstances, displaying great perseverance, ingenuity, and intelligence; they carefully guard their eggs, and are affectionate to their young, which in some cases devour their mother. The webs form sometimes nets for the capture of prey, sometimes partly or wholly dwelling-places. They descend by their silken threads head downward, but climb up on them head upward, rolling them into a bundle during the ascent; the thread cannot be used a second time for the same purpose. When they wish to go from tree to tree, some let go a thread in the direction of the wind, and when it has reached the object they strengthen and pass over it, in this way travelling long distances without descending to the ground. Young spiders of several families frequently float in the air supported by a few threads of silk. [See Gossamer.] They are capable of some domestication; Pelissou, a prisoner in the Bastille, had a pet spider which came regularly, at the sound of a musical instrument, to get its meal of flies.

In former days both spiders and their webs were thought to be efficacious in intermittent fevers, &c. The web is still used as a styptic. Attempts have been made to render the silk surrounding the eggs available for manu-

facturing purposes, but with little success, as the silk is inferior in strength and lustre to that of the silkworm, and cannot be wound. The poison of some of the foreign species is very virulent, and is dangerous to human beings. Spiders are eaten by some savage tribes in various parts of the world, and are preyed upon largely by birds and reptiles.

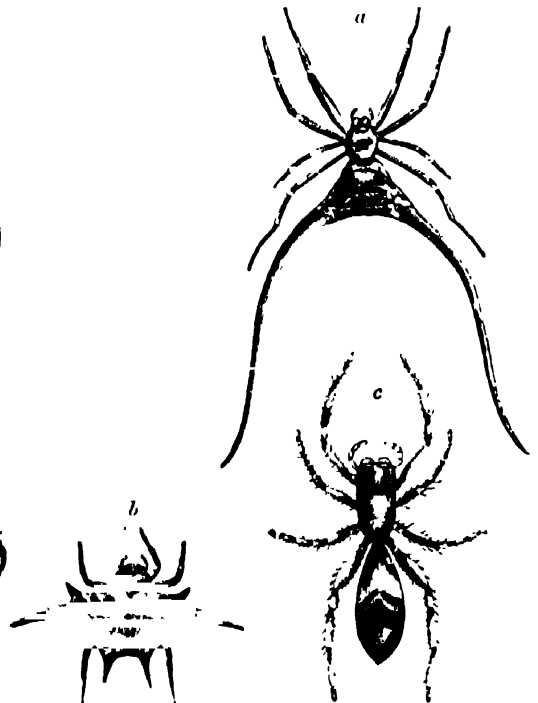
The order Araneidea is divided into two suborders, Tetraneumones, with two pairs of lung-sacs and two pairs of spinnerets, and Dipneumones, with one pair of lung-sacs and usually six or eight spinnerets. The first suborder contains only the family Mygalidae, chiefly from the warmer parts of the world. The gigantic tropical species of MYGALE live in trees, under stones, &c., in a tubular silken dwelling, from which they issue forth at night in pursuit of prey; one species from South America (*Mygale aricularia*, fig. 1) kills and devours small birds. The TRAP-DOOR SPIDERS (Cteniza, &c.) also belong to this family, living in burrows in the ground, which are lined with silk and closed with an accurately fitting lid; the only British species of the family, *Atypus sulzeri*, lives also in burrows, but does not construct a trap-door. The

Fig. 1.



M. pale avicularia.

Fig. 2.



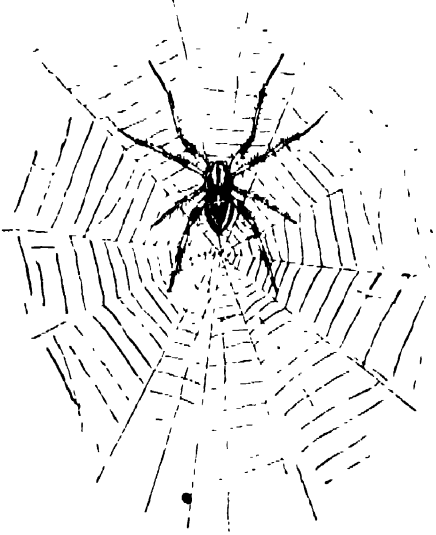
a, *Aerosoma arenata*; b, *Gasteracantha*; c, *Salicinus formicarius*.

family Salticidae, or jumping spiders, are small or of moderate size, and abundant all over the world. They prepare no snare for the capture of their prey, but crawl up to it stealthily and capture it by a sudden spring. *Salticus scenicus* is common everywhere in Britain on walls, trees, palings, &c.; another British species, *Salticus formicarius* (see fig. 2), closely resembles an ant. The Lycosidae, or wolf spiders, are also wandering spiders, catching their prey by running it down. Some of the American species are very large, and all are remarkable for ferocity; some, as our common *Lycosa piratica*, run on the surface of water and catch insects. The tarantula of Southern Europe (*Lycosa tarantula*) has acquired an evil reputation, its bite being supposed to induce delirium and madness. The Thomisidae, or crab spiders, are so called from their short body and long crab-like fore-legs,

as well as from their habit of running sideways. They are small spiders, numerous and widely distributed, concealing themselves usually in herbage and flowers. The British species are numerous. The Tegenariidæ, or Tubitelæ, form a very large family, the members of which weave a large web with a tubular portion which serves as a hiding place. The Common HOUSE SPIDER (*Tegenaria domestica*) belongs to this group, and also the WATER SPIDER (*Argyroneta aquatica*), which constructs its nest beneath the surface of the water. The family Theridiidæ is most numerous in the temperate parts of the Old World; the species construct irregular webs in which to catch their prey. The bite of one of the species, the Malmignatte (*Latrodectus malmignattus*), common in the south of Europe, especially in Corsica, produces serious and even fatal effects in human beings. The Epeiridæ, or geometric

spiders, construct beautiful, regular, circular webs (see fig. 3), with threads radiating from the centre and connected by cross threads. The typical genus *EPEIRA* contains the Common Garden Spider (*Epeira diadema*).

Fig. 2.



In tropical America are several curious spiders of allied genera which have the abdomen more or less horny and produced into spines or long processes; two of these, *Aerosoma* and *Gasteracantha*, are shown in fig. 2.

The harvest spiders, or HARVEST-MEN, belong to a distinct order, Phalangiden.

SPIGELIA is a genus of plants belonging to the order LOGANIACEÆ. The species are natives of tropical or sub-tropical America. They are annual or perennial herbs, with purple or blue funnel-shaped flowers, arranged in terminal one-sided spikes. All the species have handsome flowers, and hence are desirable for the garden, but are rather difficult of cultivation. *Spigelia marylandica* (Maryland worm-grass or pink root) is a native of Virginia, Maryland, Carolina, and Georgia, in rich moist soils, by the edges of woods, and is also found in the forests on the banks of the Arkansas. Although all possess active properties the Maryland worm-grass is that which is principally used in medicine. It has slight narcotic powers, and in large doses causes vomiting and purging. In America the fresh plant has decided anthelmintic virtues, but is only useful against the *Ascaris lumbricoides* or large round worm. In Europe it is little used, as it loses much of its power by keeping. *Spigelia Anthelmia* (annual worm-grass) is a native of Guiana, Trinidad, and Brazil. It possesses powerful narcotic properties, and is used in the same manner as the last. This species is often cultivated; it has small pale-red flowers.

SPIKE, in botany, is a form of the inflorescence of plants in which the flowers are arranged around a common axis, upon which they are directly seated, no flower-stalk intervening between the axis and the flower. The flowers may be either arranged at intervals along the axis, as in the vervain, or crowded, as in the plantain. A *catkin*, as in the willow, birch, &c., is a form of spike, pendent, deciduous, and bearing unisexual flowers only. A *spadix* is a thick fleshy spike with the flowers more or less embedded in it, the axis being simple in the aroids, branched in the palms. A compound spike, found in many grasses, is a collection of spikes or spikelets arranged in a racemose manner. The cone of firs and pines is also regarded as a modification of a spike.

SPIKE ISLAND, one of the principal depots for Irish convicts, is an island on the west side of Cork Harbour, one mile south of Queenstown. Its area is 98 acres. Strong fortifications have been erected here since 1791, and a prison for 1000 convicts was established in 1847.

SPIKENARD is a substance which has enjoyed celebrity from the earliest period of the world's history, and has engaged the attention of numerous commentators on the works of the ancients, as well as of some modern authors. It was one of the substances esteemed by the Greeks and Romans, and is mentioned in the Bible, since the *nard* of scripture is supposed to be the same substance as the *nardus* of the ancients, called also *nardostachys*, and hence spikenard, the word *stachys* being rendered by the word spike. There can be no doubt that the *nardus* described by Dioscorides is the *jatamansi* of the Hindus. This plant, *Nardostachys jatamansi*, is a species of the order VALERIANACEÆ, and is a native of Northern India. [See NARD.] The roots are esteemed as a perfume, and are also used as a stimulant in medicine. The name spikenard was also given by the ancients to perfumes used as substitutes for the true or Indian spikenard. These were obtained from species of the allied genus *Valeriana*, growing on the mountains of the south of Europe. The roots of *Valeriana celtica* and of several other species are in the present day collected by the Styrian peasants and exported by way of Trieste to Turkey and Egypt, and thence to India and other parts of the East, where they are highly prized for perfuming baths. The name spikenard is given in America to *Aralia racemosa*, a plant growing 3 or 4 feet high, with a smooth branching herbaceous stem and compound leaves and umbellate inconspicuous flowers. The roots are highly esteemed as a medicine. Ploughman's Spikenard is the name given in England to a species of Compositæ, *Inula Conyza*, a common hedge plant with a somewhat aromatic odour.

SPILANTHES is a large genus of tropical weeds, belonging to the order COMPOSITÆ, whose leaves are characterized by a peculiarly pungent taste. The Para Cross (*Spilanthes oleracea*) is cultivated in tropical countries as a salad and pot-herb. It is a smooth, erect, branching annual about a foot high, with terminal solitary yellow flower-heads. The Japanese call it Hoko-so. Its native country is unknown.

SPILSBY, a market-town in Lincolnshire, about 28 miles south-east of Lincoln, and 126 from London by rail. The population was only 1482 in 1881. In the market-place are the town-hall and the market-cross; there are also a handsome church, several dissenting chapels, and a grammar school. Sir John Franklin, the celebrated and ill-fated arctic navigator, was a native of the town.

SPINA BIFIDA, or **CLEFT SPINE**, is the name given to a congenital malformation, characterized by a tumour of spherical or oval form upon some portion of the spinal column, most commonly in the lumbar and sacral regions. In cases where it appears, there is a deficiency of two or three spinous processes and the laminae, the rudimentary portions of the arches of the vertebrae being spread out and irregularly expanded. The spinal cord being thus left unprotected, its membranes protrude through the aperture posteriorly, forming a kind of hernial tumour. It is often found associated with other congenital deformities, such as hydrocephalus, club-foot, &c., and as a rule children so affected do not survive for more than a few days or weeks after birth. In some instances, however, the fluid filling the sac gradually cozes out, when the tumour contracts to a small hard nodule, and a cure is thus effected. In other cases, where the outer covering of the tumour is firm and strong, it continues gradually increasing in size, without causing material inconvenience up to the adult period of life. The treatment of this disease consists in smallappings frequently repeated, and followed by gentle compression, by means of cotton wool

or lint and strips of plaster. Another method, introduced and practised successfully by Professor J. Morton of Glasgow, consists in the injection of iodo-glycerine.

SPINACH (*Spinacia*) is a genus of plants belonging to the order *CHLOROPHYTES*. There are three or four species, natives of the East. The Common Spinach (*Spinacia oleracea*) originally, it is thought, a native of Western Asia, is now cultivated everywhere as a pot-herb. It is cultivated both as an annual and a biennial. It has an erect hollow stem, 2 to 3 feet high, and large, thick, ovate or triangular, stalked, succulent leaves. The flowers are dioecious, the male in long terminal spikes, while the female are axillary and clustered. There are two distinct varieties in cultivation, the prickly spinach, with the fruit rough and prickly, and the smooth or round spinach, with the leaves somewhat round in shape and the fruit smooth. The leaves of the spinach form a very wholesome vegetable, which may be prepared in various ways.

Spinach has been cultivated in Europe from time immemorial, but its native region was not known till Olivier announced that he had found it growing wild in Persia. It does not appear to have been known to the ancients. It is first mentioned by Arabian physicians, and appears to have been known to the Spaniards from a very early period. For the winter crop the seed is sown at the beginning of August. A light, dry, rich soil should be preferred, and, if possible, in a sheltered situation. When the plants have put forth two pair of leaves the ground should be hoed and the plants thinned. By October or November the outer leaves of the spinach are fit for use. In February, when fine weather occurs, the plants should be again attended to, cleaned and thinned out, and in this way it may be made productive till April or May, by which time the summer sort will be ready. The first sowing of the round-leaved spinach, or smooth-fruited, should take place at the end of January in some sheltered border. This

should be successively thinned out till the plants are 8 or 10 inches apart. Successive sowings may be made in order to insure a constant supply in February, March, and April, and, if desirable, these sowings may take place between rows of cabbages, &c. After the stem begins to develop the leaves become bitter and unwholesome.

New Zealand Spinach is *Tetragonia expansa*, the young stems and leaves of which are eaten as spinach in New Zealand; it has also been cultivated both in this country and on the Continent.

SPINAL CORD. See NERVOUS SYSTEM.

SPINDLE. The spindle, our native English word for the first invented implement for twisting thread, is in reality but another form of the idea underlying the Latin *fusus* and the Greek *atrallos*, for spindle undoubtedly is closely allied to the Greek *spao*, to draw out. All three names refer to the drawing out of the thread by the weight of the twirling spindle. The form of the spindle is so characteristic as to be often referred to in describing similarly shaped objects—which are therefore known as *fusiform*. The mode in which the spindle and distaff were used is explained in the article *SPINNING*.

The spindle, as an emblem of the domestic arts, was much venerated in antiquity. It was always a prominent object in marriage processions, and was a favourite thank-offering of young married females in the temples, who dedicated to Athena or Minerva (goddesses of spinning) their

old spindle when they could no longer use it. A Greek or Roman matron did not lightly change nor willingly lose her own special spindle, but used it during her whole life of labour; consequently it became a venerated relic after the user's death. As a religious symbol the spindle was sacred to the Fates.

SPINDLE-SHELL (*Fusus*) is a genus of molluscs belonging to the order *GASTEROPODA* and family *Muricidae*. The shell, as its name implies, is spindle-shaped. The spire is many-whorled—the first, or body whorl, being much dilated. The canal is long and straight, and the operculum ovate and curved. The species are numerous and world-wide in their distribution. *Fusus colossus* and *Fusus proboscidealis* are two of the largest living gasteropods. The species best known in Britain is *Fusus antiquus*, the "red whorl" of England and "roaring buckie" of Scotland. It is used as bait for cod, and sometimes as food. The shell, suspended horizontally, is employed in the Shetland cottages as a lamp—the cavity containing the oil and the canal the wick. It is called "roaring buckie" from the belief that in it may be heard the sound of the sea, as described so well by Wordsworth:

"I have seen
A curious child applying to his ear
The convolutions of a smooth-tipped shell,
To which, in silence hushed, his very soul
Listened intensely, and his countenance soon
Brightened with joy: for murmuring from within
Were heard sonorous cadences, whereby,
To his belief, the monitor expressed
Mysterious union with its native sea."

Some of the rarer British species of *Fusus* are highly prized by collectors.

SPINDLE-TREE (*Euonymus*) is a genus of plants belonging to the order *CHLASTERIET*. There are about forty species, shrubs or small trees, widely distributed over Asia, Europe, and North America. The genus is chiefly known by its fruit, which is a capsule with four (rarely three or five) lobes inclosing as many cells, and opening when ripe in as many valves along the middle of each cell; the seeds are solitary in each cell, inclosed in a fleshy brightly coloured arillus. The Common Spindle-tree (*Euonymus europæus*), also known as prickwood, dogwood, pegwood, skewer-wood, is common in hedges and thickets in England, but does not reach far into Scotland, and is local in Ireland. It is found throughout temperate and Southern Europe, extending into Western Asia. It is usually a shrub from 3 to 5 feet high, but sometimes a small tree, attaining a height of as much as 20 feet. It has lanceolate, shortly stalked, opposite, persistent, shining leaves and axillary cymes of small yellowish-green flowers, which give out a fortid odour. The capsule is pale crimson when ripe, opening to show the seeds inclosed in a bright orange arillus. The spindle-tree flowers in May or June. The leaves, flowers, and fruits are poisonous, but the last is sometimes used as a dye. The wood is light yellow, hard, tough, and easily worked. It is used for spindles, skewers, and fine articles of turnery. The charcoal made from the young shoots is much valued for crayons.

Euonymus latifolius, a native of Southern Europe, with broad shining leaves and large red pendulous capsules, and several other foreign species, are cultivated in shrubberies.

SPINE or THORN, in botany, is the term applied to hard sharp-pointed woody processes formed by modification of an organ or part of an organ. Most frequently they are the extremities of branches, as in the sloe, gleditschia, &c. In the barberry some of the leaves are transformed into spines; in the false acacia-tree the stipules are represented by a pair of spines at the base of the petiole; in the holly spines are sometimes developed on the surface of the leaves. Spines must be distinguished from prickles (*aculei*), which are mere excrescences, arising from the epidermis, as in the Bramble and rose.



Spindle and Distaff.

SPINE, CURVATURE OF. The principal forms of disease distinguished under this heading are two—(1) *Angular curvature* or "Pott's disease," and (2) *Lateral curvature*. The former of these affections, which was first described in its pathological characters by the eminent surgeon Percival Pott, is caused by the inflammation of the bodies of the vertebrae and of the intervertebral substance, usually commencing in the latter. It is often accompanied with tubercle, whence some authorities hold that it is essentially a scrofulous disease, but it is certain that angular curvature may be caused by injury to the spine quite independently of any constitutional tendency. In many cases it may be traced to direct injury, such as that caused by a fall or a blow upon the back, and in a still larger number of cases it appears to result from some rick or twist, of which the immediate symptoms were but slight, but which, nevertheless, laid the foundation of serious disease. When the disease is of constitutional origin, there is generally sufficient evidence of a strumous constitutional condition, though in some instances the disease appears to become developed during a period of special debility, such as that which sometimes follows an attack of whooping cough, measles, or scarlet fever. The immediate cause of the curvature is caries, and the earliest symptoms noticed are pain in the back, which is increased by movement and percussion, and which gives rise to certain peculiarities of attitude in walking or sitting, the existence of a sore and tender spot in the spinal column, and a certain want of flexibility in some portion of its length. The progress of the disease is extremely variable, but usually within six or nine months of its commencement angular curvature is produced. If the case proceeds favourably, that is, without external abscess or paralysis, the disease becomes arrested at this stage, bony ankylosis commences, which becomes complete in about three years, and the patient recovers health, although the deformity remains permanent. Spinal abscess, however, is a common accompaniment of this disease, the pus pointing in the groin, and finding its way from the dorsal region beneath the fascia of the psoas muscle, under Poupart's ligament, forming what is known as "psoas abscess." The abscess sometimes appears above Poupart's ligament, and sometimes in the loin, forming in the latter case lumbar abscess, while when the cervical vertebrae are affected the abscess appears in the pharynx.

The treatment of this disease must be both constitutional and local. The constitutional treatment must include careful attention to the general health, and the employment of tonics and alteratives, such as iron, quinine, iodine, hypophosphite of lime, cod-liver oil, and other drugs of the same class. The local treatment varies very much according to the age of the patient and the situation of the disease, but in all cases it proceeds upon the lines of recumbency, counter-irritation, and mechanical support. When the disease is diagnosed in its earliest stage, absolute recumbency should be insisted on, and it is during this stage that the use of counter-irritation is most serviceable. In the second stage of the disease, *i.e.* after the curvature has taken place, absolute recumbency for a period of from one or two years must be insisted on, and this is especially necessary when the disease occurs in the cervical or upper dorsal regions. As the case improves, partial recumbency, with mechanical support, may be resorted to, and when the disease occurs in childhood, these remedial measures must be continued for a prolonged period, in some cases even until the completion of growth. A new method of treatment, introduced by Professor Lewis Sayre of New York in 1877, the essential feature of which is the encasing the body of the patient (which is first ingeniously straightened as far as possible) in a jacket or case of plaster of Paris, has been tried with considerable success in many cases, but it has the disadvantage of producing troublesome sores

through pressure and friction. More recently poroplastic felt, softened by steam before using, has been introduced in the place of the plaster of Paris, and this being buckled on in front, can be removed as often as required.

Lateral curvature of the spine is a deformity or contortion in which the bodies of the vertebrae deviate laterally in a horizontal direction, the deviation being usually accompanied with more or less rotation of the spinal column, due to the action of the ribs, which are carried down on one side more than on the other. It is sometimes met with as a congenital affection, and many cases occur in infancy or early childhood, but the disease is most frequently met with among delicate girls between the age of ten and twenty years, and women of sedentary habits. Those who enjoy good health and take much exercise are not often subjects of this disease, as the symmetry of the spinal column is preserved principally by the action of the muscles. In its early stages, lateral curvature is apt to escape detection, the first notice taken of it being generally the prominence of one shoulder, more frequently the right, or some elevation of the hip. The curvature is always double, that is when a curve has taken place in the upper dorsal region, a complementary curve in the opposite direction will be found in the lumbar region, giving the spine a sigmoid appearance. The treatment in slight cases is good diet, pure air, and well-regulated exercises, and sometimes the administration of suitable tonics. When the curvature is considerable, treatment consists in a combination of mechanical support, gymnastic exercises, and partial recumbency, great attention being paid to the position of the body when lying in bed. In cases of confirmed structural curve, mechanical support, though it cannot cure, may yet be of service in relieving and preventing an increase of the disease.

SPINELLE, the general name of a group of gems consisting essentially of alumina and magnesia, and tinged with minute traces of the oxides of iron and chromium. There are four varieties of coloration in these stones, which are denoted by different names: the scarlet examples are known as Spinelle Rubies, the violet as Almandine Rubies, the orange-red, Rubicelles, and the rose-colour, Bails Rubies. There is also a dark variety, with brilliant lustre, called Pleonaste. All these, however, are inferior to the true Ruby in hardness, and their value is very much less. A large number of the gems are obtained from the mines of Ceylon; some are picked up in the river sands of Siam, and others occur at several localities in North America.

SPINET, the precursor of the harpsichord, an instrument with what we now know as a "pianoforte-keyboard," with one metal string to each note. The string is not struck but plucked by a quill or plectrum, set in a "jack," which latter is a light wooden upright lifter carrying a centred tongue, also of wood, and a cutting of quill that projects and serves as a plectrum to twang the string. The jack, when raised by the key, causes the sound, and the sound is damped by a small piece of cloth attached to the jack. Perhaps the use of metal for plectra preceded that of quill. In the eighteenth century the quill was sometimes replaced by leather. Scaliger, who was born in 1481, and was a native of the Venetian States, wrote in after life that he remembered the introduction in his boyhood of the little plectra to clavier instruments; and from these points resembling thorns, the instruments previously called arpechordum and clavicymbalum, but commonly monochords, became known as spinet; that is to say, he derived *spinetta*, the Italian name, from *spina*, the Latin and Italian name for thorn.

But in reality the name "spinet" came from a Venetian clavier-maker called Spinetti, who about the year 1500 adapted the clavicembalo, hitherto of irregular angles, into a rectangular case. This is quite settled by the discovery of Signor Ponsicchi of Florence, who in 1876 found an old

musical book of 1608, where the author, a certain Banchieri of Bologna, says, "The Spinetta was the name from the inventor of that oblong form, who was one Maestro Giovanni Spinetti, a Venetian; and *I have seen* one of these instruments with this inscription *Joannes Spinetus Venetus fecit, A.D. 1503.*" Here it is distinctly the form of the case, and not the use of a plectrum, that gives the name spinet: it is quite possible that the very first spinets were not plectral instruments. But the form and the plectral-jacks alike date from about 1500; and in 1885, at the International Exhibition, London (Inventions and Music) an upright spinet, or clavichordium, was actually shown, of the date between 1490 and 1510, differing from the ordinary spinet only in being stood on its edge, instead of lying horizontally. The oldest spinet (horizontal) is a *Spinetta a Tavola* of beautiful pentangular shape, dated Verona 1523, now in the Conservatoire, Paris. At South Kensington are some spinets of a quarter of a century later. Later a "winged" shape (distinctly resembling the shape of our horizontal grand pianofortes) was introduced and the tuning pins brought above the keys in front. The old rectangular spinet was now called the *virginale*, and the new variety, the *Spinetta traversa*, was called when it reached England at the Restoration the Stuart spinet. Later it gained the name of the Couched-harp and the Queen Anne spinet. It was supported on a triangular or three-legged frame, its own graceful shape being somewhat triangular. The "naturals" were frequently black, in which case the "sharps" were of ivory, an arrangement exactly the reverse from that now followed. Under Charles II. the English spinet rose to the large compass, for that day, of five octaves (G to G); and the sound-hole, hitherto always used in all instruments, was abandoned. We read in Pepys's Diary how he went "to Howard's to look upon an Espinette, and did come near to buying one, but broke off." This was 10th July, 1668. But he soon repented, for on 15th July, he records "at noon is brought home the espinette I bought the other day of Howard: costs me £5." The "triangles" he bought shortly after. Two Howard spinets were shown in the exhibition of 1885 above referred to.

Frequently in the later history of the spinet (which lasted down to 1780 as a favourite instrument) an octave spinet, or *ottarina*, tuned an eighth higher, was used in conjunction with the large Queen Anne spinet. This was the origin of the octave string of the harpsichord. As with the harpsichord the spinet was not good for playing full chords: the only method of producing them satisfactorily was in arpeggio.

SPINNING. The art of twisting fibres into a continuous thread or line is one of extreme antiquity, the most primitive apparatus being the spindle and distaff. [See SPINNING.] The distaff in its first form was merely a bar of wood, to the top of which the material to be spun was loosely attached, generally by being wrapped up in a soft ball, to which the end of the distaff was inserted. The distaff was held under the left arm of the spinner, and the spindle a smaller tapering piece, to which the end of the thread was attached, was made to rotate and recede from the spinner by a dexterous twist, the thread being drawn out between the forefinger and thumb of the right hand so long as the twisting of the spindle lasted. It was then drawn in, the new length of thread wound upon it, and the operation was repeated. The top of the spindle was usually fitted with a slit to hold the thread, and a whorl of stone or earthenware was fixed at the bottom. Representations of spinning are to be seen on some of the earliest monuments of Egypt, and the art of preparing and weaving thread was there carried to high perfection, as we find under **LINEN**. Whorls of stone and baked clay are also found in large numbers in many pre-historic deposits. Till the use of these exceedingly simple instruments continued until comparatively recent times, the first improvement

consisting in the use of a wheel to turn the spindle, which was at first driven by the hand, and afterwards arranged for a treadle.

The primitive modes of spinning by the spindle and distaff, and by the spinning-wheel, which are still extensively practised in the East, only enable the spinner to produce a single thread; but with the almost automatic spinning machinery which has been called into existence by the cotton manufacture, one individual may produce nearly two thousand threads at the same time. The history of the series of inventions by which this result has been gradually attained has been already given in the articles **AUTOMATIC** and **COTTON SPINNING**. In respect to flax, the preliminary processes are described under **FLAX**. As the fibres of flax have not the same tendency to mutual entanglement as those of wool and cotton, it is necessary to moisten them with water to make them adhere to each other during the process of spinning, and also to render them more pliable and easy to twist.

The manufacture of yarns or threads of silk is a process essentially different from the spinning of cotton, wool, or flax. Instead of combining a number of short fibres into a long thread, the silk-throwster receives the silk in the form of very long and exceedingly fine filaments, which merely need cleansing and twisting together until the requisite strength is attained. The twisting process is, in this case, called spinning. There is, however, besides the best portion of the silk, which is wound off from the cocoon, a quantity of loose or *floss* silk, which forms a soft tangled mass enveloping it. This, with the refuse of the superior part of the silk, under the general name of *waste*, is converted into yarns for coarse or inferior articles, by a process very similar to that of spinning other fibrous substances. This waste silk was formerly cut by a machine, to reduce its filaments into short lengths, and then treated much in the same way as cotton wool: but the process of manufacturing it into yarns has been recently much improved by the adoption of contrivances similar to those used in flax-spinning, by which the filaments are heckled or drawn out into a sliver without being cut. The spinning of hempen fibres into cordage is described under **ROPE**. In many of the smaller kinds of ornamental spun-work, caoutchouc or India-rubber is now largely used. See **INDIA-RUBBER**.

SPINOZA (also written *Spinosa*), **BARUCH** or **BENEDICT**, the "God-intoxicated philosopher," was born at Amsterdam, 24th November, 1632. His father, Michael d'Espinoza, was an opulent Portuguese Jew, who fled from persecution from Portugal to Holland. He caused his son to be educated for the rabbinical office, and the young Baruch, by the brilliancy and precocity of his intellect, gained at first the admiration not only of the masters of the Hebrew School in Amsterdam, but also of the chief rabbi, Moses Morteira, who became his instructor in the Talmud and the Kabbalah. Soon, however, the youth, who had been introduced by means of his Latin studies to the philosophy of Descartes, began to inquire into the foundations of Jewish theology, in a manner which awakened resentment among his teachers, and led to his being suspected of heresy, so that before he had reached his fifteenth year he was accused, in consequence of his questions, of contemning the law of Moses, and denying the immortality of the soul and the reality of angelic communications. Summoned before a rabbinical tribunal, he endeavoured to anticipate ex-communication by withdrawing himself from the synagogue; but this was not allowed to avail him, and on 27th July, 1656, the offended rabbis pronounced against him the terrible anathema *schammatha*, which cut him off from Judaism and held him up to the execration of all its adherents. Before the publication of this sentence, the life of Spinoza was attempted by a fanatical Jew, and in consequence of this attempt he resolved to remove from Amsterdam. Leaving the

city, he dwelt for a short time with a friend in the vicinity at Auwerkerke, from whence, about 1662, he moved to Rynsberg, near Leyden, and in the following year to Voorberg. After remaining there for a considerable period, he was induced by his friends, somewhere about 1670, to settle at the Hague, where he spent the remaining years of his life. In accordance with the precepts of the Talmud, he had acquired in youth a mechanical art, his choice being that of grinding and polishing lenses, and being a skilful workman he had no difficulty in earning sufficient for his modest requirements, while giving much of his time to philosophical study. In order to procure this leisure, he reduced his bodily wants to a minimum, subsisting upon simple food, dressing very plainly, and living in lodgings of a very modest and unpretending character; and this mode of life he continued after his means of subsistence had become assured by a pension which he received from the De Witt family, and which was commuted after the murder of John de Witt. The publication of his first work, "*Renati Des Cartes Principiorum Philosophiæ, Pars I. et II., More Geometrico Demonstratæ*" (Amsterdam, 1663), which contains in an appendix the germ of his "*Ethica*," immediately gave him the reputation of a great philosopher, his fame spreading beyond the Hague, over his native country, and throughout most European nations. His second work, "*Tractatus Theologico-Politicus*," published anonymously in 1670, treats of the relation between religion and the state, and is entirely distinct from his philosophical writings. Religion, he maintained, is neither doctrine nor *cultus*, but is essentially the love of God, the expression of which is piety and obedience, its worship being virtue. Doctrines belong to the domain of philosophy, actions to that of the state, feelings to that of religion. Absolute freedom should prevail in the first and the last, while the second should be regulated by the state in the interest of order and tranquillity. He therefore advocated a state church which should ordain ceremonies, but leave liberty of thought inviolate. Numerous replies to his work appeared both from philosophers and theologians, but it was widely read throughout Europe, being published and translated with divers devotional, historical, antiquarian, and even medical titles employed to disguise it. Averse from controversy, and shrinking before the storm this treatise had aroused, Spinoza withheld his other and more important works from publication, and by his directions they were left to be issued after his death, by his friend Ludwig Meyer, a physician of Amsterdam. In 1673 the professorship of philosophy in the University of Heidelberg was offered him on condition that he taught nothing opposed to the established religion, but this offer he declined, professing that he was not fit for public exertations, and that he could better fulfil his mission in the world by giving written expression to his thoughts and convictions. At another time when it was proposed to obtain a pension for him from Louis XIV., he replied that he had nothing to dedicate to that monarch. Concerning his mode of life, he spent most of his time in solitude, but relaxed his mind occasionally with easy conversation. He was so studious in his habits that he sometimes passed whole months without leaving the house, being occupied only with meditation, conversation with his friends, and the writing of letters on philosophical subjects. In his conversation he was as unassuming and gentle as he was frugal in living and plain in attire, and his self-command was such, that though not incapable of anger, he never permitted any external sign to become manifest. His manner was always easy and courteous, and children, young men, servants, all who stood to him in any relation of dependence, seem to have felt the charm of his affability and sweetness of temper. To those who were unfitted for theological speculation he enforced the necessity of devout and pious conduct, and it is recorded that when on one occasion his landlady consulted him as to whether her

religion would bring her salvation, he replied, "Your religion is good; you need look about for no other, nor doubt that you can be saved in it, provided that while you apply yourself to piety you lead at the same time a loving and tranquil life." Of a weak frame and warm southern temperament, his sedentary mode of life and the rigour of the climate induced the disease of consumption in comparatively early life, and towards the close of 1676 his health began seriously to fail him. He continued to pursue his usual avocations, however, until 22nd February, 1677, when he died suddenly and unexpectedly in the presence of his medical friend, Louis Meyer, whom he had sent for two days previously. He was buried a few days after, in the new church upon the Spay, in presence of some of the most distinguished persons at the Hague. After his death, his manuscripts were, in accordance with his own instructions, sent to his publisher at Amsterdam, and within a year appeared his "*Ethica, Ordine Geometrico Demonstrata*," containing his philosophical doctrine, which had been written between 1663 and 1666; "*Tractatus de Intellectus Emendatione*," and "*Tractatus Politicus*," both of them fragments; a collection of letters to Oldenburg, Simon de Vries, Ludwig Meyer, and Blyenbergh, and a fragmentary sketch of Hebrew grammar, aiming to give it a logical development. Of these works it may be said that in the "*Ethica*" he presents in a distinct form the principal ideas upon which he had pondered during the best period of his intellectual life. Setting out with seven axioms and eight definitions, he aims at resolving, in mathematical form, all the highest questions of philosophy, descending gradually from the heights of Absolute Being, and reproducing demonstratively the order and relation of events in the orderly development of their *a priori* conceptions. The mathematical method of Spinoza is an essential part of his system, and before writing his "*Ethica*" he had laid the foundation in a logical treatise on method, which in an unfinished state forms the "*Tractatus de Intellectus Emendatione*." The opening sentence of this work is significant: "Experience," he says, "having taught me the vanity and emptiness of the ordinary events and aims of human life, as I saw that the objects of anxiety and alarm were in themselves neither good nor evil, but only through their relations to mind, I resolved finally to investigate whether there exists a true good, which itself alone can satisfy the entire soul—which when found and possessed may give to the soul supreme and eternal happiness." Such happiness, according to Spinoza, may be attained even in this life by the philosophical spirit, and the "*De Intellectus Emendatione*" is an attempt to point out the way. The fragmentary "*Tractatus Politicus*," an original but paradoxical work, deals with the philosopher's ideal of society and the state, his political principles being akin to those of Hobbes.

In respect to his philosophy it may be observed that the whole system of Spinoza is a demonstration from the eight definitions and seven axioms of the first book of the "*Ethica*." According to him it follows from the definition of substance that it is necessary and infinite, that it is one and indivisible, and that it is therefore God, the only self-existent, all-perfect, and absolutely infinite Being. Nothing exists except substance and the modes of its attributes. Substance cannot produce substance, and therefore there is no such thing as creation, no beginning or end, but all things have necessarily flowed from the infinite Being, and will continue to flow on for ever, in the same manner as from the nature of a triangle it follows, and will follow from eternity to eternity, that the angles of it are equal to two right angles. Of the infinite number of infinite attributes of Deity only two are known to us, extension and thought, the objective and subjective of which he is the identity. Body is a mode of extension, which being illimitable cannot be divided; thought is also infinite, and

mental acts are modes of it. It follows also that God is the only free cause (*causa libera*); all other things and beings move by fixed laws of causation, without free will or contingency. He is the *causa immutans omnium*, not existing apart from the universe, but expressed in it, as in a living garment. As conceived in his attributes simply and alone, he is *natura naturans*; as conceived in the infinite series of modifications which follow from the properties of these attributes, he is *natura naturata*. Between bodies, the modes of extension, and ideas, the modes of thought, there is a constant parallelism. The duality everywhere appears, and a soul belongs alike to animals, vegetables, and minerals. Man is a complex example of this compound. There is no reciprocal influence between the bodily and the ideal world, but a perfect harmony, since it is the same substance, affected in the same manner, but expressed under each of the two attributes. Individual beings, whether ideas or bodies, are modes, the changing forms of substance, to which they are related as wavelets to the ocean. The finite has no existence as such; substance is not made up of modes, but is prior to them; and Hegel therefore remarks that Spinoza rather denies the existence of the material universe than identifies God with it. The human mind has two chief ways of knowledge, the intuitive through the reason, and the imaginative. The imagination, which deals with the objects of experience, represents the world as a multiplicity of individuals. It obtains a partial and inadequate view of the images which appear before it, considers modes as things, and names them man, horse, tree, &c. The reason sees together in their unity what the imagination isolates and individualizes, and attains to adequate or exhaustive knowledge, to universal or divine ideas, which are pure thoughts, not involving the conception of extension, and not consisting in images or words. The mind is passive and in bondage in so far as it is influenced by inadequate ideas, and is active in so far as its ideas are adequate. If all objects of knowledge be regarded in their relations to the one absolute Being, the knowledge of particular outward things, of events, or history, becomes in fact a knowledge of God, and the more complete such knowledge, the more the mind is raised above what is perishable in the phenomena to the idea which lies beyond them. It dwells exclusively upon the eternal, is occupied with everlasting laws, emancipates itself from the conditions of duration, and secures its immortality, by becoming "of such a nature that the portion of it which will perish with the body, in comparison with that of it which shall endure, shall be insignificant." The law of passion is that all things desire to seek for energy, for fuller and ampler being. Every sensible being pursues that which will give it increased vitality. Man gathers life and self-mastery only from the eternal Being; the love of God is the extinction of all other desires; and virtue is the knowledge and power of God in the human soul, the exhaustive end of human existence. The ethical principles in which the philosophy of Spinoza results were proposed by him as identical with those of the Christian religion.

The best complete editions of Spinoza's works in the original Latin are those of Paulus (two vols., Jena, 1802-3); Giffoni (Stuttgart, 1830); Bruder (three vols., Leipzig, 1843-49), and Van Vloten and Land (two vols., s.v., 1882-83). There are also German translations by Barthold Auerbach, with a biographical notice (five vols., Stuttgart, 1841; new edition enlarged, 1871), and by J. H. von Kirchmann and Schaarschmidt (1871, *et seq.*); French translations by Emile Saisset (two vols., Paris, 1843; enlarged edition three vols., 1861), and by J. G. Barth (1863, *et seq.*) Spinoza's newly discovered "Tractatus de Deo et Homine" was edited and published by Van Vloten (Amsterdam, 1892). For English readers the best works to consult are the "Benedictus de Spinoza" of

Dr. R. Willis (Lond. 1870); "Spinoza's Ethica," translated by W. H. White (London, 1883); a translation of the whole of the works of Spinoza by R. H. M. Elwes (London, 1884); F. Pollock's elaborate and scholarly "Spinoza, his Life and Philosophy" (London, 1880); and Dr. James Martineau's interesting and critical "Study of Spinoza" (Lond., 1882). A monument to Spinoza was erected at the Hague 21st February, 1877, when the 200th anniversary of his death was celebrated with considerable enthusiasm.

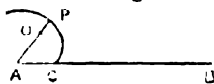
SPIRÆA is a genus of plants belonging to the order ROSACEÆ, tribe Spiracæ. The species, about fifty in number, form small unarmed shrubs or perennial herbs, natives of the temperate and colder regions of the northern hemisphere. They have alternate leaves, simple or compound, generally stipulate, and small white or red flowers in axillary or terminal cymes. The flower has a persistent five-cleft calyx, five petals, numerous stamens, and five or more pistils; the parts of the flower are rarely in fours instead of in fives; the fruit is a several seeded follicle. The Meadow Sweet or Queen of the Meadow (*Spiræa ulmaria*) is common in Britain in damp meadows, on the banks of ponds and ditches, &c., and is also distributed throughout Europe and Northern Asia. It is an herbaceous plant with erect rigid annual stems, 2 to 4 feet high, pinnate serrate leaves, white and downy on the under surface, and terminal dense corymbs of small, white, very fragrant flowers. The Dropwort (*Spiræa filipendula*) is found in dry pastures and heaths as far north as Caithness, and in a few places in the west of Ireland. It grows to a height of 1 or 2 feet, and has pinnate leaves, the segments of which are deeply toothed, and rather larger scentless flowers, white, tipped with red. The fibres of the root-stock are swollen here and there into oblong tubers, of which pigs are said to be fond. A variety of the dropwort with double flowers is cultivated in gardens. *Spiræa salicifolia*, a native of Eastern Europe, Northern Asia, and North America, has been long cultivated in our shrubberies, and is now found growing wild in plantations in some parts of the north of England and the south of Scotland. It is a shrub 4 or 5 feet high, with dense terminal clusters of pink or rose-coloured flowers.

Several of the foreign species are cultivated in gardens in this country as ornamental plants. *Spiræa tomentosa*, from Canada and the United States, is a handsome shrub with dark green leaves, covered on the under surface with a whitish, thick, woolly down, and pyramidal panicles of rose-purple flowers. This plant is used in America as a tonic and astringent. *Spiræa prunifolia*, from Japan, has smooth lanceolate leaves, silky beneath, and pure white flowers. Several of the species are astringent, and might be used in tanning.

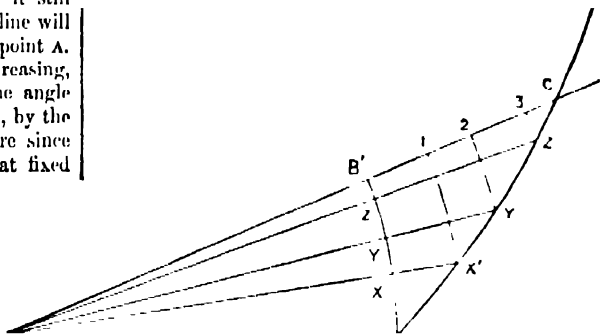
SPIRAL, a name belonging properly to curves which wind round a point in successive convolutions. The easiest mode of representing such curves algebraically is by means of polar co-ordinates; hence, in many of the older English works, any curve referred to such co-ordinates is said to be considered as a spiral. Thus we have the circle considered as a spiral, the ellipse considered as a spiral, and so on.

The word spiral means in Greek "coil," and is derived from the resemblance of the curve to the coil of a snake. Another term for the spiral is *polar curve*, derived from its inner nature; for it is of the essence of a spiral that it shall have a strongly marked reference to a pole, and it is best explained in a popular manner by some such reference as the following, which describes the useful *Spiral of Archimedes*. (Archimedes did not discover this spiral, which was invented by Konon of Samos B.C. 250; but its properties were fully developed by the greater mathematician whose name it bears.) Let A be a rod, upon the end of which the smaller rod Ar is centred, so that if it were of finite length its extremity r would strike out a circle as it revolved round A as a centre. But now, suppose that in-

stead of AP being of finite it is of variable length, increasing according to a definite rate as it turns; so that while it was only as long as AO when it lay along AB , and the extremity O lay upon the point C , it has increased to AP by the time it has turned as far as P . And since it still increases at the same rate the extremity of the line will describe the spiral CRQ as it revolves round the point A . But all this time the angle has likewise been increasing, that is, the angle which AP makes with AB (the angle BAP in the figure); and this increase is, of course, by the law of the circle, also at a definite rate. Therefore since both the line AP and the angle BAP increase at fixed



For, with the radius B , describe the circle BB' from the centre A , cutting the lines first drawn in the points XYZ ; then it at once appears, by the property of the spiral given above, that the angle BAX : the angle BAZ :: $XX' : YY'$



Spiral of Archimedes.

rates, we can ascertain the ratio borne by the increase of one to that of the other, and this ratio gives us the equation to the spiral. Now, in the figure the extremity of AP has moved from O to P , while the angle has increased from nothing to BAP . Let θ be the number of degrees of the angle BAP , and b be the amount of lengthening undergone by the revolving line while it passes through one degree, then $b\theta = OP$. And if the line at any position AP contain r units of length, while AO or AO (the length at first starting of the revolving line) contains a units, then the line $OP = r - a$ units of length $= AP - AO$; and the polar equation to the spiral takes the simple form $r - a = b\theta$; or, collecting -

$$r = a + b\theta.$$

A spiral of Archimédès can be easily drawn if a slotted arm be centred on a disc, a pencil point passing through the slot and marking the paper beneath. If this point did not move along the slot in the arm it would of course trace a circle on the paper, but it is perpetually drawn along the slot, further and further from the pole (or centre), as the arm moves upon its centre, by a string which is fastened to the pencil, and which passes over a pulley at the end of the arm to a fixed point on the edge of the disc. Because, as the arm rotates, the string coils itself upon the (grooved) edge of the disc, and of necessity therefore draws upon its free end, and so pulls the pencil point outwards along the arm: by as much string as is coiled upon the edge of the disc, by so much is the string lessened between the end of the rotating arm and the pencil point.

A well-drawn spiral of Archimédès cut in brass, ivory, &c., is a valuable adjunct to a box of mathematical instruments. For by means of the properties just described it serves to divide a line according to the divisions of an angle, or an angle according to the divisions of a line. And since it is quite easy to divide a line in any possible fashion, it becomes equally easy, with the help of this spiral, to divide an angle in the same ratios.

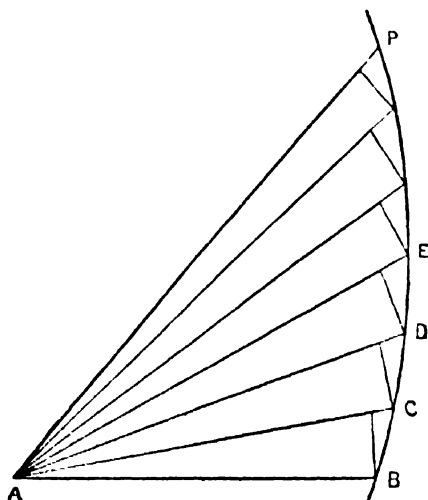
For let BAC be the angle to be divided; then place A at the pole of the spiral, and let AC , one of the legs of the angle, be divided at 1, 2, 3 in the required proportions. Then let any part of a spiral of Archimédès cut across the angle at any point, as the spiral $BX'Y'Z'$ in the figure, cutting the legs of the angle BAC in the points B, C . Next, with the centre A and distances 1, 2, 3 respectively, describe circles cutting the spiral, and to the points where they cut, as X', Y', Z' in the figure, for example, draw lines from A . Then AX', AY', AZ' shall divide the angle in the same proportions as the line AC is divided by the points 1, 2, 3.

Divisions of an angle by Spiral.

—that is, as $B'1 : B'2$ —and the division of the angle BAC by the lines AX, AY , is exactly the same as the division of the line AC by the points 1 and 2. The same holds good of the line AZ and the point 3.

Of course the converse, to divide a line in the same proportion as a given divided angle, is equally easy, and merely demands an exactly converse construction.

The *Equiangular or Logarithmic Spiral*, invented by the famous Descartes, is also an instrument of much power. The construction of this spiral may be best understood by supposing ABC to be a triangle whereof the sides AB, AC , are almost equal, AC being slightly the larger. The inequality is of course exaggerated in the diagram. Upon AC draw another exactly similar triangle, ACD , AD being as much larger than AC as AC is than AB , and the angle DAC equal to the angle CAB . Then upon AD describe



Logarithmic Spiral of Descartes.

the triangle ADE , and so on. The points B, C, D, E , &c., will, if the equal angles BAC, CAD , &c., be taken sufficiently small, melt into a curve.

Now as $AC : AB$, as $AD : AC$, and as $AE : AD$, &c., we may call this ratio μ . Let there be b triangles in the whole triangle BAC , and let λ denote the b^{th} power of μ ; that is, let $\lambda = \mu^b$. Then if, as before, the value of AP is called r , and the original length of the revolving line (AB)

be called a , and θ be the angle NAR , we get as our polar equation to the logarithmic spiral of Descartes—

$$r = a\lambda^\theta.$$

Or the ratio of AR to AN in the logarithmic spiral is equal to a certain number λ raised to the θ power, where θ represents the magnitude of the angle NAR in units of angle.

We get several important results from this spiral. Its name, equiangular, is sufficiently explained by the construction. It is evident, moreover, that the ratio of any pair of rays is equal to the ratio of any other pair which include an equal angle with the first pair. The name logarithmic arises from its power of replacing multiplication by addition, in the same way as we do by the use of logarithmic tables. For if it be desired to multiply the ratio $\text{AN} : \text{AR}$ by the ratio $\text{AC} : \text{AD}$, and θ be the angle between the first pair and ϕ the angle between the second pair (whether these angles are equal or not matters nothing), then by the property of the spiral

$$\frac{\text{AN}}{\text{AR}} = \lambda^\theta, \text{ and } \frac{\text{AC}}{\text{AD}} = \lambda^\phi; \text{ therefore } \frac{\text{AN}}{\text{AR}} \cdot \frac{\text{AC}}{\text{AD}} = \lambda^{\theta+\phi};$$

that is to say, we add the included angles θ and ϕ together, and the ratio of the legs of the new joint angle is the ratio demanded—in the present case, the ratio $\text{AN} : \text{AD}$.

SPIRANTHES is a genus of orchids (ORCHIDÆF). There are about eighty species, from the tropical and temperate parts of the world, but the majority are American. Three species are found in Britain, where they are known as lady's tresses. They are herbs, with tuberous or stout fibrous roots, numerous linear leaves growing from the root and stem, and small flowers in a spirally-twisted spike. The Common Lady's Tresses (*Spiranthes autumnalis*) is common in dry pastures in most parts of England, as far north as Westmorland and Yorkshire, and it also occurs in parts of Ireland; it is widely distributed over Europe. It has a tuft of three or four spreading radical leaves, by the side of which is the flower-stem, 4 to 8 inches high, which has no leaves, but short sheathing scales; the flowers are white and very fragrant, in a close spiral spike. The tuberous roots of this species were formerly esteemed as an aphrodisiac. *Spiranthes aestivalis* is found in bogs in a few places in the extreme south of England.

SPIRE (from the Old English *spir*, spike or stalk), a term of Gothic architecture used to designate the tapering pyramidal mass erected on a tower by way of finish and ornament. In German a spire is called *spitze* or *thurm-spitze*; in French *gloche*, from its resemblance to the pointed tip of an arrow; the Latin *spira* has nothing to do with this word, for it signifies a coil or spiral line, and not a cone.

The origin of the spire is matter of conjecture. The probability is that it arose out of the peaked roof usually given to campanili and towers, gradually improved upon and refined, till it eventually grew up into the slender tapering spire. A gradual and progressive transition cannot, however, be clearly traced. On the contrary, some of the earliest deviations from the simple pyramidal form appear to have produced uncountness rather than lightness; for although much greater loftiness upon the whole was so occasioned, the appearance of it was reduced by the sides of the tower being made to terminate in gables cutting into, and therefore partly cutting off, the base of the pyramidal spire itself. Many of the earlier German edifices contain examples of this distinction.

There are so many peculiarities in spires that it is highly desirable to have descriptive terms for them. First, as regards the base, a spire may be said to be *cluster-based* if surrounded by walls or pinnacles connected with it,

and from among which it seems to arise, of which kind St. Mary's, Oxford, is a celebrated example. Where there are windows placed against a spire, rising upright like the dormers or lucernes on a roof, the term *lucerned* would express that character. *Crocketed* and *banded* require no explanation. *Finialled* is a term which does not apply to any of our English spires, but that of St. Stephen's, Vienna, and some other continental examples, have an exceedingly large and rich finial, which ornament gives them a particular boldness of expression. Neither have we any instances of *openwork* spires, or of such as, if not actually perforated, are yet entirely covered with tracery. Those at Freyburg, Burgos, and Batalha are exceedingly rich specimens of this kind.

There are various other circumstances which, though they do not affect the spire itself, produce greater or less difference in regard to the character of the structure of which it is a component feature. Very much, for instance, depends upon its situation in the general plan; at Salisbury, Norwich, and Chichester the spire is raised upon a tower at the intersection of the cross or in the centre of the plan, whereas in most continental churches there are two spires on the towers of the west front, though in some instances (Strasbourg, Antwerp) only one has actually been erected. Several, however, have a single tower and spire in the centre of the west front (Ulm, Freyburg, Thann in Alsace), in which case the tower itself begins to diminish almost from the ground. In most of our English churches (not cathedrals) the spire is placed upon a tower at the west end, as at Grantham, Louth, Bloxham, &c. If we except Peterborough (where they are very diminutive), the only English cathedral which has two western spires is Lichfield, which is further remarkable as having a central tower and spire also.

SPIRES or **SPEYER**, an ancient city in Rhensish Bavaria (the former Palatinate), is situated on the left bank of the Rhine, 12 miles by railway south from Mannheim, and has 15,589 inhabitants. It is surrounded with walls and ditches, and has five gates. The most remarkable structure is the venerable cathedral, founded by the Emperor Conrad in 1030, and completed by Henry IV. in 1061. It once contained the remains of eight emperors, three empresses, and two imperial princesses, but their marble sepulchres, statues, and silver collars were desecrated and plundered by the French in 1689, and again in 1794. The building has been thoroughly restored, and now presents the finest specimen of Romanesque architecture in the world. In the old palace the diet of the German Empire was frequently held in former times. One of the most important of these diets was that of 1529, when a protest made by the Reformers against certain proceedings of the emperor's procured them the name of Protestants. The city has Roman Catholic and Lutheran churches, a town-hall, a gymnasium, a lyceum, an hospital, an orphan house, and a botanic garden. In the Hall of Antiquities there is a collection of Roman and ancient German remains found in the neighbouring country. The chief manufactures are snuff, tobacco, vinegar, sugar of lead, and wax; there are likewise considerable cattle and corn markets, and an active transit trade on the Rhine. Spire was the ancient *Norionagus*, an important Roman station and the winter quarters of Julius Cæsar. In the middle ages it was the residence of many German emperors. It suffered most severely from the French invasion and occupation in 1689 (during the war of the Orleans succession), when the inhabitants were expelled and the greater part of the houses and public buildings either blown up or burnt. In 1794 it was again overrun by the French under Custine.

SPIRIFERIDÆ is an extinct family of molluscs belonging to the order BRACHIOPODA. The name is derived from the spiral shape assumed by the calcareous appendages, which were directed outwards, and nearly filled

the interior of the dorsal valve of the shell; they supported the arms or breathing organs, which were immovable. The valves were articulated by curved hinge-teeth fitting into sockets. This family, which contained numerous species, appeared in the Silurian epoch, and became extinct in the middle of the Liassic. The majority of the species belonged to the genus *Spirifera*, which had the shell transversely oval or elongated, not punctated; and the hinge-area which

and muscles; (2) the vital spirits, which were lodged in the heart, and caused the blood to flow and the bodily organs to fulfil their functions; and (3) the natural spirits, which were seated in the liver, and which controlled the general nature or character, the disposition and temper of the man.

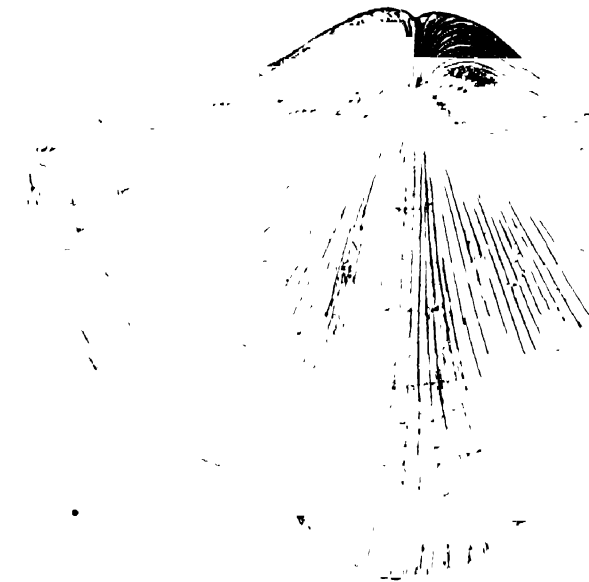
SPIRIT FRESCO, a method of fresco painting with wax, gum, elemi, and copal, the essential oil of spike being used as the solvent, described by Paillet de Montabert in vol. viii. of his "*Traité Complet de la Peinture*" (nine vols., Paris, 1829), and perhaps invented by him. It was improved and introduced into this country by M. Gambier Parry, and the two splendid large frescos of St. Frederick Leighton, P.R.A., at the South Kensington Museum ("Arts of War," "Arts of Peace"), the chief works of art of the closing quarter of the nineteenth century, are painted in this medium.

The great merit of spirit fresco (Montabert's "*peinture encastique*") is that the whole surface may be plastered and made smooth, allowed to dry and then carefully made sound and ready before painting. The portion set out for the day's work is then

softened and made porous with the spirit, and is worked on in the same manner as fresco proper. It is evident that the result is far more secure and durable. Some think, however, that the colour still is slightly. See **Fresco**.

SPIRIT-LEVEL, a tube of glass nearly filled with spirit or other suitable liquid, and hermetically sealed at both ends so that when held with its axis in a horizontal position, the air which occupies the part not filled with the spirit or water places itself contiguously to the upper surface. The tube, to the unassisted eye, appears to be exactly cylindrical, but in reality it has a slight convexity upwards. The air bubble places itself at the highest point of that convexity, and a tangent to the tube at the centre of the bubble is a truly horizontal line. In using the level, it is commonly adjusted until the bubble is at the middle of the length of the tube. The slighter the convexity of the tube the more sensitive is the level; that is, the greater is the deviation of the bubble produced by a given displacement of the tube.

The spirit-level, as used by artificers, is simply fixed in the top part of an oblong case made of some hard wood. The bottom of the case is made truly plane and truly parallel to a tangent at the middle of the tube, so that when the case is laid upon any plane surface, the fact of that surface being horizontal is indicated by the bubble placing itself in the middle of the length of the tube, and any want of accuracy in the position of the surface is shown by a deviation of the bubble. To test whether the level is accurately adjusted to parallelism with the bottom of its case, lay the instrument on a plane surface as nearly horizontal as can be found, and observe the position of the bubble; then take up the instrument, turn it end for end, and set it down exactly in the same place, when the bubble ought to assume exactly the same position as before. If the two positions of the bubble are different, half the distance between them is the deviation caused by inaccurate adjustment.



Spirifera striata. Scale, $\frac{1}{4}$.

separated the beaks of the dorsal and ventral valves were very conspicuous. In those from the Devonian rocks the shell was often winged or drawn out at the lateral angles. The species figured, *Spirifera striata*, is from the Yorkshire coal measures.

SPIRIT. The word *spirit* is the Latin *spiritus*, breath, and hence anything as unsubstantial as breath is called a spirit. Further, since "the breath is the life," the "spirit" of a thing is used as describing its quintessence, its inner life, vital force, or meaning. Hence spirit comes to mean the invisible as contradistinguished from the visible and material universe, and we have a whole philosophy, that of **SPIRITUALISM**, which proclaims spirit as the ruler of the universe of matter. The visions of dreams or hallucinations, the soul of man, and even one manner in which we recognize the manifestation of God, alike bear the name of spirit. Ghosts, demons, angels, fairies, and all such airy phantoms, are but "breaths" or spirits. Again, by distillation we procure a volatile inflammable liquid, the vitalizing force, as it would appear, of wine and other liquids, and therefore this, too, we call spirit. And lastly, we name any person or any animal "spirited" in whom life is brimming over and cannot be restrained within the ordinary bounds; we regard them as full of spirit more than the common.

In alchemy, besides the seven bodies (gold, silver, iron, mercury, lead, tin, and copper) connected with the sun, moon, and planets, there were four spirits:—

"The first spirit quicksilver called *az*;
The second orpiment, the third *I w*;
Sal ammoniac; and the fourth breinstoon."

(quicksilver, orpiment, sal ammoniac, and sulphur), as witness Chaucer in the canon's "*Yeoman's Tale*."

In the scholastic medicine and philosophy three divisions of spirits were recognized as informing the human body, namely:—(1) The animal spirits, whose dwelling-place was the brain, and whose function was to stimulate the nerves

The levelling instrument used in surveying consists essentially of four principal parts: the spirit-level proper or tube, the telescope, the vertical axis, and the stand. The telescope has a very fine horizontal wire in the common focus of its object-glass and eye-glass, crossed usually by two vertical wires. The centre of the horizontal wire is in the line of collimation, or horizontal axis, of the telescope. The spirit-level is so fixed that when truly adjusted a tangent to its middle point is exactly parallel to the line of collimation of the telescope, in order that when the bubble is at that point the line of collimation may be truly horizontal. The adjustment of the level and telescope to parallelism is effected by means of screws, which in some instruments are those which connect the brass casing of the spirit-level tube with the telescope, while in others they are those acting upon the diaphragm or frame that carries the cross wires. The telescope is connected with the vertical axis by adjusting screws, by means of which the line of collimation can be fixed in a position exactly at right angles to the vertical axis; this is in order that when the vertical axis has been placed truly vertical, and the telescope is turned about, the line of collimation may continue to be horizontal in what direction soever it may be pointed. The fact of the vertical axis being truly vertical is indicated by the bubble placing itself at the centre of the spirit-level when the telescope is turned so as to point successively in four directions at right angles to each other. The position of the vertical axis is adjusted by means of screws which connect it with the stand.

Along with the levelling instrument (or level, as it is called simply) is used the *levelling staff*, being a rectangular wooden rod of from 10 to 17 feet high, having (when British measures are used) a scale of feet and decimal subdivisions very distinctly painted upon it. The staff-holder holds the staff exactly upright upon a given spot; the observer, having properly adjusted the instrument, looks through the telescope at the staff, and he sees the horizontal wire apparently cutting the scale that is painted on the staff at a point that indicates the depth of the spot on which the staff is held below the line of collimation. When the staff is held successively at two spots, and observed from the same station, the difference between the divisions read off is the difference of level of those two spots, the greater reading corresponding to the lower spot. The whole use of the levelling instrument consists in a series of repetitions of this process. When the distance from the instrument to the staff materially exceeds a furlong, a correction for the curvature of the earth and the refraction of light by the air is to be made, as follows: divide the square of the distance by the earth's diameter (about 8130000 feet); five-sixths of the quotient is the correction to be subtracted from the height read on the staff. See SURVEYING.

SPIRITUALISM, a term formerly used to designate the doctrines and religious life of certain Christian mystics who professed to live under the sensible guidance of the Holy Spirit, and who were further distinguished by their practice of interpreting the sacred Scriptures in a "spiritual" rather than a material manner. Jacob Boehm, Molinos, Madame Guyon, and Madame de Bourignon, though not an extension of the same communion, are representatives of the somewhat numerous class of religiousists, particularly of the seventeenth century, to whose teachings and practice the appellation of spiritualism has been applied. The term has also been used in connection with philosophy. (Its application of the term is explained further on.)

At the present day, however, the word Spiritualism is employed almost exclusively to designate a movement which had its origin in the United States about the middle of the present century. Spiritualists themselves claim a much earlier origin for their belief, and assert that phenomena nearly identical with the "manifestations" of

modern mediums appear in many ancient histories, in the Delphic oracles, in the lives of seers and wonder-workers, and in the books of the Old and New Testaments. Modern spiritualism, however, can be traced no further back than to the period of the publication of the writings of Andrew Jackson Davis, known in America as "the Seer of Poughkeepsie." This man, the son of a cobbler, possessed a dreamy impressionable temperament, and before he reached the years of manhood had begun to see visions and hear mysterious voices. About 1843, after the visit of an itinerant mesmerist to Poughkeepsie, a tailor named Levinston discovered that Davis possessed astonishing powers of clairvoyance, and especially that of revealing the "interior condition" of his visitors, so that he could tell their diseases and prescribe for them. Levinston quickly perceived that something might be made of this, and he arranged with Davis a round of visits to many of the towns of the United States, during which Davis exercised his powers for the benefit of his fellow-creatures and a modest fee of five dollars. The arrangement proved profitable to both parties, but at Bridgeport, Connecticut, the adventurers made the acquaintance of two gentlemen, Dr. Silas Smith Lyon and Mr. William Fishbough, who persuaded Davis to sever his connection with Levinston, and under their guidance Davis entered upon what he called the superior state of *clairscience*, and made spiritual revelations of an extraordinary character. The disappointed Levinston afterwards disputed the genuineness of these revelations, and ascribed them to the new patrons of Davis, but when they were published in two volumes, entitled "The Principles of Nature," or "Divine Revelations of Nature," and the "Great Harmonia; being a Philosophical Revelation of the Natural, Spiritual, and Celestial Universe," they were eagerly read by large sections of the American public. In these volumes Davis enunciated the most extraordinary and grotesque views of the constitution of the universe, and propounded some new theories concerning the existence of good and evil. Our space will not permit of any quotations from these remarkable volumes, but a good account of them is given in the *Edinburgh Review* for October, 1865. Shortly after the publication of these books, and while the sensation caused by their appearance was at its height, there came strange tidings from the town of Accadia, in the State of New York, of direct communications with the spirit world held by the daughters of a Mr. John D. Fox. The members of the family of Mr. Fox asserted that in March, 1848, they were disturbed by unaccountable raps in various parts of their house, and soon afterwards they discovered, by asking questions which were answered by raps, that the house was haunted by the spirit of a murdered man, whose body was buried in the cellar. But for the reported conversations with the spirit, in which answers were readily given by rapping, we should have had merely one ghost story the more, but it was something new to be able to carry on a dialogue with an invisible spirit, and this quickly attracted public attention. The two daughters of Mr. Fox, Margaret and Kate, soon announced that they had obtained visits from other spirits than their first acquaintance, and that their supernatural visitors came at their summons, making a series of curious manifestations, such as lifting heavy tables, ringing bells round a room, throwing about pieces of wood or stone, playing upon musical instruments, and producing a phosphorescent light. In November, 1849, the Fox girls appeared in a public hall, and the phenomena were freely manifested, a committee being appointed for their investigation. The committee reported that they were unable to trace the phenomena to any mundane agency, and the alleged spiritual manifestations became the subject of extensive newspaper and conversational discussion. In May, 1850, the Fox girls arrived at New York, and their fame spread rapidly throughout the country. As might be expected,

a considerable number of individuals in different parts of the States, on hearing of the "manifestations," quickly discovered that they too possessed similar powers, and spiritualism became almost a mania in many parts of the country. The persons who claimed to be able to attract the influence and the communications of the spirits obtained the name of *mediums*, and as early as 1853 there were computed to be many thousands of these persons in America, their believers (or dupes) being numbered by tens of thousands. A year or two earlier, a Mr. Daniel Douglas Home, a person of British origin, but who had gone in early life to America, had acquired a widespread reputation for his powers as a medium, the phenomena attending his exhibitions being reported to transcend anything attained by the ordinary mediums, his first exhibitions being given in Springfield, Mass., and in Hartford, Conn. In 1855 he left the United States for Europe, and his arrival in England was the means of giving an immense impulse to the study of spiritualism in this country. Previous to his advent a number of American mediums had started in business in London, giving exhibitions of their powers in private houses and public halls, charging a fee for attendance or admission, and many persons had been induced to form "spirit circles" in order to test the reality of the new teaching. Mr. Home, however, aimed at higher game, and his abilities were such that he obtained admission to the highest circles of society, and his powers as a medium became a topic of general conversation among the upper classes. So great was his success, that he was privately received by more than one European sovereign, and the French emperor Napoleon III. and Alexander II. of Russia are said to have given him large presents of jewels and money. At a later period he contrived to get an English lady named Mrs. Lyons under his influence, and to obtain from her no less a sum than £60,000; but when she subsequently quarrelled with him, he was compelled by a legal tribunal to refund the money. Meantime the phenomena said to attend the mediums rapidly increased in number and importance, and the manifestations were reported to include the answering of questions by raps; the movement of tables and other ponderable bodies by unseen agencies; the production of phosphorescent lights in a dark room; the playing on accordions and other musical instruments by invisible hands; the movement of the hands of the medium when in a state of trance, so as to give information in writing; the introduction of flowers, fruits, and other bodies into closed rooms; the levitation of human beings; the production of pictures, the medium being in darkness or in a state of trance; and ultimately the crowning glory of "materialization," or the appearance of a spirit under a rapidly acquired and equally rapidly dissipated material form. Both in the United States and in England the phenomena were made the subject of investigation by persons whose honesty of purpose was beyond suspicion, and in many instances the result of the investigations were the emolument of the investigators among the number of believers. Among the more prominent of these persons were Robert Dale Owen, Mr. Sergeant Cox, Mr. Alfred Russell Wallace, Professor De Morgan, and Mr. William Crookes, F.R.S. editor of the *Quarterly Journal of Science*, a gentleman of high and well-deserved reputation in the scientific world. Some of the inquirers, like Lord Rayleigh, who investigated the subject while rejecting the theories of the mediums, were yet led to believe that the phenomena observed resulted from some hitherto unknown force, capable of being tested and examined independently of any theory upon the subject, and the name "physic force" was adopted as its designation. As time passed on, however, very many of the exhibitions both in America and England were discovered to be of a fraudulent character, and more than one "materialized spirit" when suddenly seized proved to be either the medium in disguise or a

confederate, while some of the mediums were successfully prosecuted for obtaining money under false pretences. It was also found by honest and independent investigators that the manifestations were of an uncertain and capricious character; that they were dependent to a great extent upon persons of questionable antecedents, who used spiritualism as a means of gaining a livelihood; that the so-called revelations were too often of a trivial and useless character, and hence the system gradually waned in popularity and ceased to attract interest. More recently spiritualism has passed into a new phase, and under the guise of "theosophy" and "esoteric Buddhism" has procured a number of fresh adherents in India, England, and America, and has given rise to a new and rapidly increasing literature. The phenomena attending the revealers of the new mystery bear a curious resemblance to the manifestations of the earlier mediums; but the theories, instead of pointing to the disembodied spirits of human beings, point rather to certain mysterious semi-supernatural beings, whose home is in Tibet, but who have lately begun to display a hitherto unfelt desire to communicate with the ordinary members of the civilized world.

With respect to the whole subject, while there can be no doubt of the honesty and general intelligence of many of the believers in spiritualism, there can also be no doubt that it is more often the offspring of credulity. In all ages of the world, and among nearly all peoples, ancient and modern, civilized and uncivilized, there has ever been a desire to communicate with the spirits of the departed, or with the supposed invisible spirits of the earth, both good and evil, and as a result there has ever been a lot of persons who have sought to turn this desire to their own advantage. Now and again some professor of the arts of the magician or sorcerer has risen above his fellows and has left a name that yet lingers in history, and it would not be difficult to trace a line of such illustrious men from the time of Simon Magus down to that of Count Cagliostro, Mr. Daniel Douglas Home, or the leading lights of the present day. Each man, with his followers, has adapted his teaching and "manifestations" to the desire and fancy of the age in which he has lived, but their methods of procedure betray a curious family likeness in spite of all the differences of age and race. It is a long way down from the wizard that "peeped and muttered" to ancient Israel, to the mediums of modern spiritualism, but it is to the same feelings and the same credulity that the appeal has ever been made, while the rebuke of the prophet (Isa. vi. 10, 20) has not yet lost its power.

To say, indeed, that all is false and imposture in spiritualism would be to assert too much, for we know as yet but little of the connection between our bodily and mental nature, of the influence which they mutually exert, of the conditions dependent upon or related to the vast range of our sympathies, sensations, and emotions. Nor can we blame those who have sought in an inquiring spirit to examine and test the phenomena alleged to exist. At the same time it must be borne in mind that eminence in science or society is no guarantee of ability to detect trickery, and that in many cases a sharp professor of legendum or a skilled criminal investigator would be far more likely to persons of either of the classes we have mentioned. With respect to the theories propounded by the mediums, it is difficult to find language sufficiently strong for their denunciation. When we are told of the spirits of the departed returning to the earth to perform such achievements as lifting tables or pushing chairs; when we hear of them as writing badly, spelling badly, and uttering a jargon of incomprehensible mysticism or replying to foolish and useless questions when we find that all the "revelations," rapped, spoken, or written, reveal nothing of value, or indeed anything that might not be in the imagination of the

medium or his associates; when we are requested to believe that "manifestations," which according to the theory should be universal, are limited to comparatively few persons, some of whom use them as a means of obtaining money, we feel compelled to resort to the terms of Carlyle, who spoke of spiritualism as "ultra-brutalism," a "liturgy of Dead Sea apes."

In connection with the literature of this subject, it may be mentioned that the books relating to spiritualism include works in most European languages, and they are to be reckoned by hundreds. There is also an extensive newspaper and magazine literature, the periodicals devoted to spiritualism numbering nearly sixty different publications. The literature is for the most part characterized by emptiness, aimlessness, absurdity, and vulgarity, but there are several works of higher character which may be consulted with advantage for the history of the subject or the higher hopes and expectations of its adherents. Among the works of the latter class may be included "Le Livre des Esprits" (Paris, 1858), with a supplementary work, "Le Livre des Mediums" (Paris, 1863); Edmond's and Dexter's "Spiritualism" (two vols., New York, 1854-55); Robert Dale Owen's "Footfalls on the Boundary of another World" (Philadelphia, 1860); Mrs. A. De Morgan's "From Matter to Spirit" (London, 1863); William Crookes' "Researches into the Phenomena of Spiritualism" (London, 1871); and A. R. Wallace "On Miracles and Modern Spiritualism" (London, 1875), one of the best of the more recent works upon the subject. An excellent account of the deceptions practised by professional mediums may also be found in Maskelyne's "Spiritualism, an Account of its Rise and Progress" (London, 1876).

SPIRITUALISM, in philosophy, is that system of the universe which regards it as divided between mind and matter, the latter being of itself inert and being wrought into activity only by the action of mind or spirit; hence the term *spiritualism*. [See the article **MIND**.] Spiritualism is therefore the exact opposite of materialism, using both words in their true philosophical sense.

The universe is also divided into the subject-world and the object-world, that which a man knows as within himself, the *ego*, and that which he knows as without himself, the *non-ego*. But the *non-ego*, or object-world, is regarded by some philosophers as being actually recognized in the real substance (realism), whereas others contend that it is only the ideas raised by the phenomena presented to the mind which we can know (idealism), and the real substance of the object-world, if there be one, cannot come within our ken. It is necessary sharply to distinguish between these closely related pairs of philosophical concepts—*realism* (in this limited sense of the word) and *idealism* being theories of man's perception of the world, *materialism* and *spiritualism* being theories of the true nature of that world. The truth seems to be, as to the relation between the two extremes, but rather on the side of spiritualism, for surely no man can conceive of himself as being in any relation, according to the materialistic hypothesis.

SPIRITUS ASPER (Latin, in grammar, the rough breathing or aspirate (marked thus, *h*) placed before Greek words beginning with a vowel, which should be pronounced like English words beginning with the letter *h*. It is also placed before all words whose initial letter is *r*.

Spiritus Louis, the soft breathing (marked thus, *h*), is placed before all Greek words beginning with a vowel which does not require to be aspirated.

SPIRULIDÆ is a family of dibrancliate CEFALOPODA, consisting of one genus, *Spirula*. They are characterized chiefly by having a spiral, discoid, chambered pearly shell placed vertically on the posterior part of the body. Like the cuttle-fish they have eight arms, two tentacles, and a siphon, but they have no fins. Their shells abound

on the shores of New Zealand, and a few are thrown on the British coast through the agency of the warm Gulf Stream. Three species, all belonging to the tropical seas, have been recognized. The animal of *Spirula* was until recently almost unknown, and it was only in 1879 that the anatomy of *Spirula australis* was accurately described by Sir Richard Owen. The body is singular, from ending in an elliptical convex sucker-like disc, by means of which the *Spirula* is said to attach itself to rocks and catch its prey in its outspread arms, somewhat after the manner of a sea-anemone. The arms are short, and provided with numerous scattered suckers.

SPIT HEAD, a famous roadstead on the south coast of England, and the principal rendezvous of British fleets, is the eastern division of the narrow channel which separates the Isle of Wight from the mainland. It is named from the Spit, a sandbank about 3 miles long, which stretches south from Gullkicker Point. Here in 1797 occurred the mutiny of the Channel Fleet, excited by bad treatment and injustice, but suppressed by the wisdom and firmness of Lord Howe. To command this important roadstead some strong forts have been erected, and the land defences on both sides of the channel are of the most formidable character.

West of Spithead is the *Motherbank*, a roadstead reserved for weather-bound merchant vessels, and off St. Helens, on the east shore of the Isle of Wight, is a third roadstead, where a squadron sometimes brings to, to wait for a favourable wind.

SPITTING was formerly recognized as a powerful antidote to witchcraft. Thus the Greeks would spit three times into the bosom of their dress at the sight of a madman or if in fear of sorcery, and Roman matrons moved in a solemn circle round their daughter's child on the eighth day after its birth, and then moistened its forehead with their spittle, to preserve it from evil charms. This custom remained for centuries, and even as late as 620 A.D. we read how Mohammed the prophet spat into the mouth of his newly born grandson Hassan for luck. Precisely the same ceremony, differing only in the ear, not the mouth, being selected, is found among the negroes of Western Africa to our own day. Boys and street hucksters yet spit on the first money they take (handsel) "for luck," and in remote parts it is still usual for the rustics to avert evil by spitting if the name of the devil is mentioned. But Scot, in the famous old treatise on witchcraft (1581, reprinted by Nicholson 1886), considers it a far better and more general protection against charms of all kinds to spit into the right shoe before putting it on, which, as he advises, "is good and wholesome to do" before you go into any dangerous place.

SPITZBERGEN is the name given to a group of islands situated to within 10 degrees of the arctic pole, 300 miles north of Scandinavia, surrounded by the Arctic Polar Sea, of which that portion which lies west of Spitzbergen is called the Greenland Sea.

The group consists of three large and numerous small islands, with an area of about 23,000 square miles. The largest is on the west, and is properly called Spitzbergen, but its most eastern part is now known by the name of New Friesland. To the east of New Friesland lies North-east Land, which is divided from Spitzbergen by the Hendooen or Waygat's Strait. East of the main body of the group is Edges Island, which is separated from New Friesland by a strait called Walter Tjymens Fiord or Alderman Freeman's Inlet. The shores are rocky and the mountains extend inland.

The climate of Spitzbergen is intensely cold. Throughout the long winter mercury freezes, and the island is completely enveloped by the polar ice, which extends for miles southward, cutting off all communication with the external world; nor is there always an open sea in summer so as to

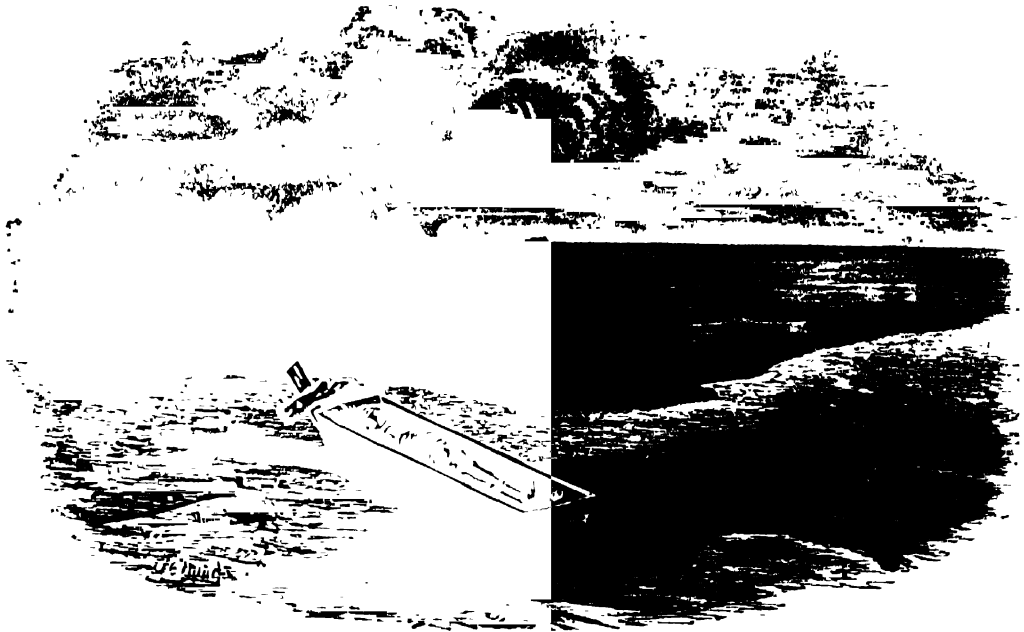
admit of the land being reached, though this is generally the case. The mean temperature of the warmest months on the western coast does not exceed $34^{\circ}50$, and even at that season this part of the island is occasionally subject to a cold of three, four, and more degrees below the freezing point. In the northern parts the longest day is four months; but from the 22nd of October to the 22nd of February the sun does not rise above the horizon. The winter is not only intensely cold, but stormy. The surface is covered with perpetual snow, and rivers of ice, or glaciers, occupy the valleys between the mountains; several of them, according to careful estimates, being 40 or 50 miles in length, by 10 or 12 in breadth. There are no true volcanic mountains, but marble and coal are found.

The number of species of flowering plants which have been found in Spitzbergen does not exceed 100, but vegetation is very rapid, and most of them spring up, flower,

and produce seed in the course of a month or six weeks. The animals met with are foxes, bears, reindeer, whales, morses, seals, and sea-fowl.

The most striking feature of the scenery is its wonderful desolation; but fossil plants have been found denoting a climate as warm as that of the Mediterranean, and even now the penetration of the Gulf Stream renders the climate warmer than the position would naturally warrant.

Spitzbergen was first discovered by Sir Hugh Willoughby in 1553, and was visited again in 1596 by Barentz, Hemskerke, and Ryp in their endeavour to effect a north-east passage to the Indies. It was named by them Spitzbergen (pointed mountains) from the numerous peaks observed on the coast. In 1607 it was visited by Henry Hudson, and four years afterwards the English began to resort to it for the whale fishery. In 1633 the Dutch contemplated a permanent settlement there, and seven



Seashore, Spitzbergen, from a sketch by Lord Dufferin.

sailors stayed for a winter, but a subsequent attempt ended in disaster. Russian hunters, however, have repeatedly wintered in huts on the coast, taking care to provide themselves with fresh provisions, and collecting the plants from under the snow which act as antidotes to scurvy. But it is not uncommon for human skeletons to be found, scantily sepulchred, or not at all, either struck down by ordinary disease or accident, or unable to endure the climate.

This archipelago, so dreary and so isolated, was brought within the range of yachting excursions by Lord Dufferin in the *Foam*, in August, 1856. In the course of a ramble on shore this nobleman unexpectedly stumbled upon a human relic. "Half imbedded in the black moss there lay a gray deal coffin, almost falling to pieces with age; the lid was gone, blown off probably by the wind, and within were stretched the bleaching bones of a human skeleton. A rude cross at the head of the grave still stood upright, and a half obliterated Dutch inscription preserved a record of the dead man's name and age: 'Vander Schelling . . . Commar . . . Jacob Moor . . . Ob. 2 June, 1758, Æt. 11.' It was evidently some poor whaler of the last century, to whom his companions had given the only burial possible in the frost-hardened earth,

which even the summer sun has no force to penetrate beyond a couple of inches, and which will not elude to man the shallowest grave. A bleak resting-place for that hundred years, I thought, as I gazed on the dead man's remains! It was no brother-mortal that lay at our feet, softly folded in the embraces of 'Mother Earth,' but a poor scarecrow, gibbeted for ages on this bare rock, like a poor Prometheus; the vulture frost gnawing for ever at his bleaching riches, and yet eternally preserving them!

A Swedish scientific expedition, under Mr. Forcell, visited Spitzbergen in the year 1861, when many positions were astronomically determined for the correction of maps, while new harbours were discovered, and numerous zoological, botanical, and geological specimens were brought away. Deep-sea soundings yielded interesting results. Several species of living Mollusca and Crustacea were brought up from the depth of 1300 fathoms. An Austrian scientific expedition visited the island in 1868. Another expedition, under Dutch auspices, discovered in 1871 the winter quarters of Barentz, with numerous interesting relics in the house, just as they were left 278 years before. Swedish expeditions have been very frequent, and in 1874 it was proposed to annex the island to Sweden, but the idea was relinquished, and the archipelago is now claimed

to Russia. Spitzbergen is frequently visited by English, Danish, and Norwegian whalers.

SPITZ FLOTE, an organ stop of the flute kind, deriving its name (pointed flute) from the fact that the pipes are tapering from the mouth upwards, giving a thin and reedy tone, very effective as a variety of timbre. The Spitzflöte is usually of 4 feet pitch.

SPLACH NUM. See *MOSSIS*.

SPLEEN. Some of the purposes which this organ serves in the animal economy still remain unknown, but it may be regarded as a storehouse of nutritive material, to be drawn upon as required by the system. It is not found in any animals below the class of fishes. Some animals have two spleens, and this number has been found abnormally in man. In form the spleen is generally somewhat oval, being smooth and convex on the exterior, where it is in apposition with the diaphragm, and irregularly concave on the opposite side, which is unequally divided into two parts by a transverse slit for the transmission of its vessels. It is for the most part placed in the left hypochondriac region, between the diaphragm and the stomach, and beneath the cartilages of the ribs. It varies so much in size that it is almost impossible to say what are its normal proportions. It is much enlarged by disease; but in health, taking a general average, its greatest diameter may be said to measure about 4 inches, its breadth 3, and its thickness from 2 to 2½; its usual average weight is from 8 to 10 ounces. Of a slight spongy consistence, it is at all times easily torn; and in many cases is found, soon after death, so soft as to be readily broken by a slight pressure, when it appears a grumous, dark, confused mass. Its colour is deeply red, with a tinge of blue, particularly towards its margin. It has a peritoneal investment prolonged to it from the stomach, by which, as well as by vessels, it is connected with that organ; but it has also a smooth and thin its tunic proper to itself, which is so firmly adherent to the serous investment above mentioned, that they cannot be separated except at its concave surface. No organ receives a greater number of bloodvessels in proportion to its size than the spleen; but it secretes no fluid of any sort, at least none that has hitherto been discovered.

Diseases of the spleen do not very frequently occur in this country, but they are by no means of unusual occurrence in most climates, whether warm or temperate, as Italy, Holland, South America, and some parts of India.

SPLEEN WORT. See *ASPLENIUM*.

SPLUGEN, one of the Lepontine or Helvetic Alps, in the canton of Grisons, Switzerland. The Splügen Pass (conducted by the Austrian government in 1825) is the pass which connects this part of Switzerland with Northern Italy. The summit of the mountain (known as the *Puntenerhorn*) has an elevation of 9600 feet; the highest point of the pass has an elevation of nearly 7000 feet.

SPOFFORTH, REGINALD, a fashionable glee-writer, was born in 1765 at Southwell in Nottinghamshire, a place famous for its venerable collegiate church, of which his uncle, Thomas Spofforth, was organist. At an unusually early age young Spofforth showed musical talent. After officiating as deputy organist of Lincoln Cathedral, he proceeded to London and studied under the fine glee-composer Dr. Benjamin Cooke. In 1794 he joined the Catch Club at St. James and a cheerful glee, and obtained both prizes. "Where are those Hours?" and "See, smiling from the rosy East," were his successful compositions. He now formed an acquaintance with William Shield, musical manager of Covent Garden, and contributed many songs, duets, &c., to his successes produced at that theatre. In 1826 his independence having him a large fortune; he, however, enjoyed his independence but for a short period. The nervousness which for many years had prevented his attempting any new work, appeared in a fatal form. He died on 8th

September, 1827. Many of his glees have become classics, and there is probably not a lover of music who is unacquainted with the delightful "Hail, smiling Morn," first published in 1799, and still as fresh as if it had been written yesterday. "Come, bounteous May" and "Health to my Dear" are others of Spofforth's masterpieces.

SPOHR, DR. LOUIS, an eminent German musician, was born at Brunswick, 5th April, 1784. His father was a physician, his mother the daughter of a Lutheran pastor. His passion for music developed itself at a very early age, and when four or five years old he prized his little fiddle above all the playthings which boys usually love. His opera "Die Zweikampf" was successfully produced in 1811; "Laust" in 1816; and "Zemna and Azza" in 1819. In 1809 Spohr conducted the first musical festival ever held in Germany, at Frankenhansen, a little place in Thuringia; and it was so successful that a second was at once organized for 1811, for which Spohr wrote his concert in E♭. He had wandered much before this, making many concert tours, serving in the band of the Duke of Brunswick, then conducting that of the Duke of Gotha, then 1812 to 1814, directing the opera at Vienna. He paid a visit to England in 1820, to conduct some concerts of the Philharmonic Society, and met with a very hearty reception. He was the first to conduct with the baton in England. In 1822 he settled down as court musical director to the Duke of Hesse-Cassel, and produced his operas of "Jessonda" and "Der Beiggeist," and in 1826 the oratorio "Die letzten Dinge," well known in England under the title of "The Last Judgment." Thorough classic as he was, it speaks volumes for Spohr's breadth of thought in musical matters that he was the first great musician to interest himself in Wagner, whose "Flying Dutchman" he brought out at Cassel in 1842 and his "Tannhauser" in 1853. Various other compositions followed—the best known in this country being his magnificent orchestral symphony (the fourth of nine such works) "Die Weihe der Töne," which has ever since been very popular in England, under its mistranslated title, "The Power (instead of the 'Consecration') of Sound." He visited England again in 1839, 1843, 1847, and 1852, and died at Cassel at a ripe old age, 22nd October, 1859. Spohr may be said to have created the modern school of violin playing. His own work on that subject (1831) is the classic of the art. He was himself a consummate master of the instrument, and has enriched its *repertoire* perhaps more than any other great composer. He was also a man of great force of character, and almost as independent and proud of his artistic position as Beethoven himself. He did wonders towards raising musicians to the honourable position they now hold. His autobiography (1865) is most amusing and interesting, if a little self-conscious.

His tall fine figure was unimpaired by age to the last, and his life-long habit of vigorous personal exercise continued until, in the January preceding his death, he broke his arm by a fall upon the ice. Spohr's playing was remarkable for grace of expression and perfection of finish; the breadth of style and grandeur of tone that might have been expected from one of his athletic figure, were curiously enough not among his characteristics. Few composers have exercised more influence upon their contemporaries than Spohr did, and many writers may be counted among his imitators. He is, however, excluded from a place among the very greatest masters by the fact of his constant employment of the same resources—his constant reproduction of the same forms and the same expression. He is especially fond, for instance, of indulging to excess in chromatic harmonies. Perfection of detail marks all his works, and his consummate mastery of orchestration is always evident. No one has contributed so extensively as he to the repertory of his own instrument, for which he wrote fifteen concertos and very many smaller concert pieces; and his thirty-three quartets also display the violin to special advantage.

SPOLE'TO, a city of Central Italy, is the capital of a circle in the province of Perugia, and is situated 60 miles N.N.E. of Rome, and 21 miles north of Rieti. It is the ancient *Spolitum*, the inhabitants of which repulsed Hannibal's attack after the battle of Thrasimene, and thus checked his advance towards Rome. An inscription above one of the gates records the event. Spoleto has been the see of an archbishop from a very early date; and in the middle ages it was the capital of a Lombard duchy. The modern town is built on an isolated rocky hill above the Maroggia, and the streets are narrow, steep, and dirty, but there are many interesting public buildings, including a handsome cathedral, adorned with frescoes and other works of art, several churches, the town-house, and the Anagnini palace, formerly the residence of the dukes of Spoleto. The castle stands on a height overlooking the town, and exhibits some remains of Cyclopean walls. The city contains the ruins of a Roman theatre, an arch, and several temples, and has other interesting antiquities. The population is nearly 20,000, who manufacture a large quantity of hats and woollen fabrics, and carry on a considerable trade in corn, oil, wine, and truffles, the produce of the neighbourhood. A Longobard aqueduct crosses a ravine 600 feet deep, and connects the town with the castle. In the Italian War of Independence Spoleto was taken and held for a short time by an Irish contingent in the service of the Pope, but it surrendered to the Sardinian troops on the 18th of September, 1860.

SPON'DEE (Gr. *spōndē*, a libation), in Greek and Latin poetry, the name of a foot consisting of two long syllables. Coleridge's phrase—

"Slow spondee stalks, strong foot,"

gives three excellent spondaic feet in English. It was so called because from its slow movement it was customarily introduced into the hymns sung in honour of the gods during the performance of the sacrificial ceremonies.

A hexameter ("six-footed") verse is composed of dactyls and spondees, generally terminating with a dactyl followed by a spondee; thus, — — — | — — —. When the two last feet are both spondees, — — — | — — — the line is called *spondaic*, but in that case the fourth foot is always a dactyl.

SPON'DIAS is a genus of plants belonging to the order ANACARDIACEÆ. The species are natives of all tropical countries, and the fruits of some are edible. In Brazil and the West Indies the fruits of *Spondias lutea*, *Spondias Mombin*, *Spondias tuberosa*, and other species, are known as Hog Plums, and, though edible, are chiefly used to fatten swine. *Spondias dulcis*, indigenous to the Society Isles, yields a fruit scarcely inferior in flavour to the pine-apple. *Spondias mangifera* yields a yellowish-green fruit, which is eaten in India, and in its unripe state used as a pickle. Its bark, leaves, and wood possess medicinal properties, and the bark also exudes an insipid gum. The bark of *Spondias venulosa* is astringent. The kernel of the *Spondias Birrea* is eaten by the natives of Abyssinia, while those of Senegal distil from its fruit an alcoholic drink. The leaves of *Spondias Mombin* are astringent, and its fruits laxative, but its seeds are poisonous.

SPON'DYLUS is a genus of molluscs, belonging to the order LAMELLIBRANCHIATA, nearly allied to the pecten and oyster, but usually made the type of a distinct family, Spondyliidae. The species are numerous, chiefly from tropical and subtropical seas, and are known as thorny oysters. The animal has the mantle open, and its margins thickened and furnished with bright eyespots. The foot is small, cylindrical, and truncated. The shell is irregular, strong, and thick, and variously ornamented with spines or plates. The beaks are apart from each other, and eared. The lower valve has a peculiar triangular hinge-area, divided by a groove and enlarging as it grows older; and the cartilage is placed in a pit which communi-

cates at its base with the external groove. The shell adheres to foreign bodies, such as rocks, coral, &c., by the right valve, being cemented to these bodies without the medium of any connecting membrane or ligament, and becoming modelled to the foreign substance on which it lies. In the inner layer of shell there are left in some of the species, as in *Spondylus varians*—hence called the "Water-clam"—spaces or cavities which are filled with water; the quantity of water contained is often considerable and remains for a length of time, perhaps years, after the shell is dry. These cavities are produced by the border of the mantle depositing shell more rapidly than the umbonal portion. Some of the tropical species have beautiful shells adorned with bright and lively colours. The genus is represented in Plate I. of LAMELLIBRANCHIATA by *Spondylus regius*, a very fine species, for the shell of which £240 is said to have been once given.

SPONGES is the name popularly applied to the dried skeletons of a group of lowly animals, used for washing purposes. For a long time the true nature of sponges was in doubt. Though their organic character was perceived by Aristotle, down to quite recent times they have been considered as plants. When first recognized as animals they were placed among the lowest forms of animal life, which comprise the Protozoa, and even now there are some naturalists who do not acknowledge their claims to a higher rank. But a closer study of their minute structure, and especially of their development, has conclusively proved their relationship with the polyps and jellyfish (Hydrozoa) and the sea-anemones (Actinozoa). Sponges now, therefore, rank as a class, Porifera or Spongia, of the subkingdom CILIENTATA.

It is difficult to understand the true nature of a sponge-animal from the huge compact colonies which form the sponges of commerce. Starting from one of the most simple of the calcareous sponges, such as *Ascidia*, the body is seen to consist of a cylindrical hollow sac, attached at one end by a sort of stalk, with a wide opening (osculum) at the other end leading into a wide cavity, and numerous pores (ostia) scattered all over the body. The body, like that of the Hydrozoa, is built up of two cellular layers, an outer layer, the ectoderm, and an inner, the endoderm, with a structureless jelly-like layer between them, the mesoderm. Sponges are thus clearly Metazoa (or Enterozoa), with tissues of differentiated cells, and are not mere unicellular colonies, as in the Protozoa. The ectoderm consists of a layer of flattened polygonal cells. The endoderm is made up of elongated collar-cells, similar to the collar-monads belonging to the group Flagellata, among the Protozoa. These collar-cells consist of a protoplasmic cell, with the protoplasm drawn out at the free end into a very thin cylindrical hyaline collar surrounding a long, flagellum. The mesoderm is very thick and jelly-like, containing nucleated corpuscles, wandering amoeboid cells, and calcareous needle-like or rayed spicules. Such being the general structure of a simple sponge, its manner of life can be explained. Immoveably fixed to rocks and other foreign bodies at the bottom of the sea, it has no tentacles, like the polyps and sea-anemones, with which to catch its prey. The water, however, streams in through the numerous pores on its surface, and by the currents produced by their flagella minute particles of nutritive matter are carried within the collar of the collar-cells, and sink into the protoplasm to be there digested. The undigestible residue is carried out of the cells and swept along the inner cavity of the body to the large opening at the top, whence it is expelled. The protoplasm of the collar is in active circulation, and thus exposes a large and cleaning surface to the surrounding water, allowing of the absorption of oxygen; in this way the function of respiration is performed. The collar-cells also multiply by fission.

From some such simple sponge-animal, immense colonies

are built up by budding, either internal or external, till at length it becomes impossible to recognize the component individuals or persons. In such a sponge, for instance, as the common Turkey Sponge (*Euspongia officinalis*), the whole surface is covered in life with a thin skin, pierced by numerous holes, the oscula, and numerous very fine tubes or pores. The pores lead into branching canals, and thence into spherical pockets or ampullæ, lined with collar-cells, which have disappeared from the rest of the body. These ampullæ are in communication also with larger branching canals, the excurrent canals, which lead eventually into the oscula. The incurrent canals bring into the substance of the sponge colony minute infusorians and algae, and the excurrent canals carry away the undigestible portions of food, and also the products of excretion. The food is accepted largely by the mesoderm cells, lining the walls of the large canals, the collar-cells being apparently mainly respiratory in function in these colonial forms. The skeleton is built up in the Turkey sponge of a network of lacy fibres, in which particles of sand and other foreign bodies are often embedded. But in other sponges the skeleton presents great variety. It may be built up entirely of spicules secreted by the mesoderm, and composed of an organic basis (*spiculin*), combined with either carbonate of lime, to form calcareous spicules, or silica, to form the silicious spicules. The calcareous spicules are either simple needles or of a three or four rayed form. But the silicious spicules present a marvellous diversity of form, with four or six rays, or shaped like anchors, spindles, or being variously lobed and branched; they may also be connected together to form a fibrous or even a stony skeleton. In some sponges the oscula may altogether vanish, the excurrent canals opening by the pores, so that it is impossible to determine the number of individuals building up the colony. The pores, it may be noticed, are really only intercellular spaces, often closing up, and being replaced by new ones by the separation of one cell from another. Large intercellular gaps often appear, too, with the increasing complexity of the colonial system, and these often form a shelter for minute worms.

The sexual reproduction by ova and spermatozoa takes place in the sponges, both kinds of reproductive cells being formed in the same colony, though in most cases they are not ripe at the same time. Both ova and spermatozoa are developed in the mesoderm, and in some forms (*Sycon*), the ova do not pass into the canal system until a ciliated larva is formed. The larva in the *Sycon*lar, in which the development has been most closely studied, when it passes out of the parent and acquires a free-swimming existence, is a ciliated sphere (amphiblastula) formed of a single layer of cells, one half small ciliated cells, and the other half large dark granular cells. The small cells become pushed over and attached into the large cells, obliterating the central cavity, and forming a sac of two cell-layers (diadastula), which attaches itself by the mouth and acquires a cylindrical form, after which the oscula breaks out at the free end, and the pores take their appearance over the body.

A curious process of asexual reproduction also takes place in some sponges; it was first observed in the common Fresh-water Sponge (*Spongia fluvialis*). In this species, besides spherical masses of mesoderm cells containing a nucleus of structure formed in the autumn, enclosed in a silicious case, beset with curiously shaped spicules, there are curious cases, which somewhat resemble the statocysts of fresh-water *Polyzoans*, drop off and remain in the neighbourhood of the water, in the spring, the contents, consisting of amoeboid cells, creep forth and reproduce the sponge.

Sponges also multiply by fission, and advantage is taken of this fact to make artificial cuttings of the sponges of commerce. The sponge is cut into small pieces under water, and fastened to wooden frames, and then sunk in

the sea to a slight depth; and in a few years' time a good crop is obtained.

All the sponges, except *Spongia fluvialis*, are marine, and are most abundant in warmer seas—they are found both in shallow water and at great depths. They date from the Upper Silurian rocks. They vary enormously in form and size, and some are brilliantly coloured. Sponges may be divided into four orders, according to the character of their skeleton.

The Myxospongiæ are soft fleshy sponges without any skeleton. There is only one genus, *Halisarca*, containing small irregular encrusting sponges, often of beautiful colours.

The Calcispongiæ, with a skeleton built of calcareous spicules only, are small sponges, often very regular in form, and world-wide in their distribution. This group, which contains some of the simplest non-colonial forms, has been made the subject of a brilliant monograph by Haeckel. It contains three families, *Asconidæ*, *Leuconidæ*, and *Syconidæ*. *Syconda compressa* is very common on our coasts between tide marks, on the under surface of rocks or seaweeds; and *Leuconda nivea*, a beautiful snow-white sponge, is found in the same situations.

The Silicispongiæ, with a silicious skeleton, are the most numerous and most varied of the whole class; they are world wide in their distribution, are found at all depths, and date from the Cambrian epoch. In the suborder *Monaxoma* the skeleton is built up of simple silicious needles. *Spongia fluvialis*, the only fresh-water sponge known, is found in irregular masses in rivers; it is green, owing to the presence of chlorophyll granules in its cells. *Amorphina panicæ* (the crumb-of-bread sponge), also occurring in green irregular masses, is common on our coasts. The Neptune's Cup Sponge (*Poterrion neptuni*) is a large cup-like form, growing on coral reefs, and found fossil in the chalk of England. A nearly allied form, *Cliona*, burrows into shells, especially those of oysters. The suborder *Lithospongiæ* or *Tetractinellæ* has usually a dense stony skeleton, formed of four-rayed interlocking spicules. They are usually found in the deep sea, and are common in the fossil state. The suborder *Hyalospongiæ* or *Hexactinellæ* has a skeleton often glass-like in appearance, built up of six-rayed spicules, often united together into a solid network by layers of silica. Some of these sponges are fixed in the mud by a tuft of long spicules, as the Japanese Glass-rope Sponge (*Hyalomma*), which has a long stalk encrusted with parasitic corals.

The Cerispongiæ have their skeleton built up of heavy fibres, forming a network in which grains of siliceous sand are often embedded. To this order belong the common bath sponges. The Turkey or Levant Sponge (*Euspongia officinalis*), cup-like in form, is found in the Mediterranean and Caribbean Sea. Another sponge of commerce from the Mediterranean is *Euspongia zanzibarica*, distinguished by its hardness and dark yellow colour. The Horse Sponge or common Bath Sponge (*Hypsospongia equina*) is coarser, of a thick cake-like form.

A report from the British vice consul at Beyrout recently published gives some interesting particulars of the sponge fishery on the Syrian coast. The average annual value is £25,000, but the production lessens through excessive fishing and the lack of any system of conservancy. About 250 boats are employed, chiefly at Tripoli, Ruad, Latakia, and Batroun. The boats remain at sea during the day, but seldom venture beyond 3 or 4 miles from shore. The time a Syrian diver can remain under water is about sixty seconds; eighty are said to be reached, but this is rare. Diving is practised from a very early age up to forty years, beyond which few are able to continue the pursuit, although it does not seem to lessen the span of life. The manner of diving is as follows:—The diver, naked, with an open net round the waist for the

reception of his prizes, seizes with both hands an oblong white stone, to which is attached a rope, and plunges overboard. On arriving at the bottom the stone is deposited at his feet, and the man, keeping hold of the rope with one hand, grasps and tears off with the other the sponges within his reach, which he deposits within his net. He then, by a series of jerks to the rope, gives the signal to those above, and is drawn up. No knife, spear, or instrument of any kind is used. The Syrian diver, unlike his Greek competitor, never uses the diving dress. The depth to which the diver descends varies from five to thirty "brasses," each equal to an ordinary man's height. Below the limit of thirty no good sponges are found. Several fatal accidents occur every year, mainly among the most skilful and daring. The diver quits his hold of the rope, and wanders some distance to secure a prize, and on returning to regain the rope misses the spot and is unable to find it. He then attempts to rise unassisted, and, being ignorant of the exact direction, often strikes out diagonally, and is drowned before he can reach the surface. The finest qualities produced on the Syrian coast are purchased by French agents, while the reddish sponges are sent to Germany and England. The Turkish government levies a tax on sponges of one-tenth their value. The value of the sponges collected in Greece and Turkey is estimated at £100,000 per annum. Those of the West Indies and Bahamas are of a larger size, but coarser quality. The quantity of sponges annually imported into the United Kingdom is valued at £150,000. The inhabitants in several of the Greek islands have been trained from their infancy to dive for sponges, which adhere firmly to the bottom and are not detached without a great deal of trouble. The extraordinary cleanness of the water facilitates the operations of the divers. The town of Cramidi, on the Gulf of Nauplia, is, however, the chief seat of the fishery, and Smyrna is the principal market. Sponges are prepared for the market by being bleached in dilute hydrochloric acid.

Medicinal Uses of Sponges.—The use of sponge by surgeons, in its natural state, to absorb fluids, needs no notice, but it is also employed by them under the name of Sponge Tent, when prepared in a particular manner. This consists in dipping the sponge in melted wax, and compressing it between iron plates till it hardens on cooling; it is then cut into cylindrical or other forms. The pieces are introduced into sinuses and other narrow canals, with the intention of dilating them by the expansion of the sponge when the wax melts.

SPONTANEOUS COMBUSTION. See COMBUSTION.

SPONTANEOUS GENERATION. See GENERATION, SPONTANEOUS.

SPONTANEOUS MOVEMENTS. A considerable part of the sources of the mind, as developed in the present work, is held to lie in the Spontaneity of Movement of the human body. The unprompted twitchings of the infant's body, the purposeless and continual movements of the limbs and features, are the way in which the energy stored up in the central motor organs overflows; and they form the material from which the infant collects his first glimmering of perception. So soon as a movement brings pleasure it attracts notice, and if by chance, in the child's continual random play, it occurs again at a brief interval, it stamps itself upon the child's attention, and after a few more occurrences it will be definitely striven for, that the expected pleasure may result.

With spontaneous movements are joined an equally large class of movements which, though apparently spontaneous, are really not so, but result from stimuli so faint as to be easily passed over. The presence of light causes the child to turn towards it by reflex action; a slight pain causes a movement of the limbs in the same way. Such movements

will tend to be repeated if they are pleasurable, in exactly the same way as the truly spontaneous movements; but the two classes must be very carefully distinguished.

SPONTINI, GASPARO LUIGI PACIFICO, the famous musical composer, was born 14th November, 1771, at Majolati near Jesi, a small town in the Roman states. He had the good fortune to be initiated in the art of counterpoint by the celebrated Padre Martini at Bologna, and afterwards studied the elements of dramatic composition under Borioni at Rome. He then entered the Conservatory della Pietà at Naples, as much, it may be presumed, for the purpose of gaining an appointment there, as with a view of acquiring any additional information. He, however, did not fail to profit by the instructions of Silvani and Traetta, at that time directors of the establishment, and at the end of twelve months attained his object, in being elected one of the pupil-teachers. When he had completed his seventeenth year he began his career as a composer. His first dramatic effort was an opera-buffa, named "I Puntigli delle Donne," to produce which he ran away to Rome (1796), and with difficulty was permitted to return to the Naples school. Its success was so great that the managers of many other theatres immediately showed their eagerness to obtain his assistance.

A number of operas from the various great musical centres of Italy now poured fast from his pen, a great contrast to the slow and highly elaborated method of composition of his later years. Cimarosa and Piccini both helped on the young maestro. After much work and many travels in Italian lands he reached Paris in 1803, and on his arrival there gave his "L'Intrigue Filosofique" at the Opera-buffa, and afterwards "La Petite Maison" at the Opera Comique. The former succeeded well, but the latter was hissed off the stage (1804). He supported himself by giving singing lessons, but never despaired of ultimate success. He worked long at the famous "Vestale," and though it was finished in 1805 his incessant alterations, even during rehearsals, delayed its performance till 1807. It at once took rank as a masterpiece, though it met with opposition as being the work of a foreigner. Its grandeur, however, overcame all such pettinesses of national feeling, and it even obtained the prize given by the government of that period for the best dramatic composition. "Fernand Cortez" was his next opera (1809), and its success gained him the directorship of the opera in 1810, but he did not long retain the post. Spontini then remained long inactive as a theatrical composer, partly owing to the political state of the times. But in 1819 he brought out at the Académie his "Olympie," an opera of great merit. The fatal event which robbed France of one of her newly-retained princes also deprived Spontini of a zealous protector, and induced him to accept the liberal offers of the King of Prussia, who invited him to undertake the direction of the Opera-house in Berlin, with a handsome salary. He there produced "Lalla Rookh," "Alcidor," and in 1825 "Agnes de Hohenstaufen." In Berlin he was perpetually in hot water. He was attacked by Rellstab the critic with such vigour that he was unable to avoid a continued discussion as to the charges of plagiarism brought against him. The perpetual quarrels due to his arbitrary temper grew worse after the death of the king, his protector. Eventually he came in contact with the court, and was condemned for a libel on the new king of Prussia, who, however, pardoned the acrimonious musician. Spontini subsequently quitted Berlin for Italy, and finally settled in France, where he was elected an academicien (one of the five members of the Académie Royale des Beaux Arts for the section of Music) in 1839. In 1847 he visited Berlin and was received very kindly by the king, who indeed had always acted with royal generosity towards him. He returned to his native place to pass the winter, in the hope of re-establishing his health, and was received at Ancona by the cardinal and authorities with

great pomp. He expired on the 24th of January, 1851, in the arms of his wife, the sister of Lind, the celebrated manufacturer of pianos. Spontini was the *beau-ideal* of a *petit maitre* of 1810. He wore the spenser over his coat in autumn; the carick with seven capes in winter; the light pantaloons and the top boot; the high cravat, with watch-chain and jewels to correspond; hat, wig, and frill, all of the same fashion. His language, manner, and ideas were all of the period of Madame Recamier. He was probably one of the vainest men who ever lived; but this must not blind one to the fact that he was a very great artist. The enormous demands which his two great operas make upon every resource of the stage, their expense, their great difficulty of rehearsal, &c., prevent them from now being heard. Points in the "Vestal" and in the "Olympia" are noted by musicians as the extreme of stage grandeur yet attained.

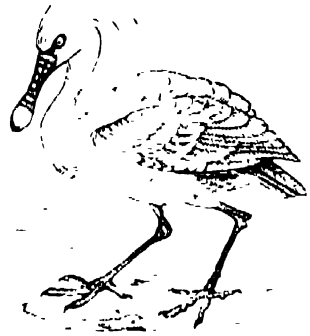
SPOON BILL (*Platalea*) is a genus of wading birds (*GRALLÆ*), belonging to the family *Plataleidae*, distinguished by the shape of the bill, which is very long and strong, much depressed and dilated at the extremity in the shape of a rounded spoon; the upper mandible is channelled and transversely grooved at the base. The nostrils are on the upper surface of the bill, near together, oblong, open, and bordered by a membrane. The face and head are partially or entirely naked. The legs are long and strong, the three anterior toes are united up to the second joint by a membrane; the posterior toe is long and partly rests on the ground. The wings are rather large; the third quill-feather is nearly as long as the second, which is the longest.

There are half-a-dozen species found in all quarters of the world, except in the northern parts. The spoonbills live in society in wooded marshes, generally not far from the mouths of rivers, and are rarely seen on the sea-shore. Their food consists of small fishes and their spawn, small molluscs, as well as small reptiles and aquatic insects. According to circumstances, they build their nests either in high trees, in bushes, or among rushes. Their moult is simple and ordinary, but the young bird does not take the confirmed livery of the adult till the third year; the bill is gradually developed, and appears covered with a membrane. The crest makes its appearance at the second year.

The White Spoonbill (*Platalea leucoroda*) is a rare visitor to Britain, but before the draining of the fens it was more common; it visits chiefly the eastern counties of England. In Europe it breeds in Russia, along the valley of the Danube, and in Spain. In Holland it was formerly a common summer resident, arriving about April, and departing southwards with the stork in autumn, but is now becoming rarer through the draining of the lakes. In France it is now only known as a bird of passage. It extends in Asia as far as China, and is also found in North Africa. The plumage of the spoonbill is pure white, with the exception of a band across the breast, which is tawny; the naked skin on the throat is yellow; the back of the head bears a crest of elongated slender feathers; the bill is black, with the tip yellow, and the legs are black. The total length of the adult male is 32 inches, of which the bill measures nearly 9 inches. The female is rather smaller, and has a smaller crest. The windpipe is curiously convoluted in the form of the figure 8. The nest is usually made amidst reeds and herbage, often in the middle of a river or swamp, but sometimes, as in India, it nests in large colonies, like the heron, in lofty trees. The eggs are four in number, dull white, with a few spots or streaks of reddish-brown. The flesh is dark, but well flavoured.

The Roseate Spoonbill (*Platalea ajaja*) is found in South America and the Southern United States. It is a very beautiful species, the general colour of the plumage being rose, paler in front, and nearly white on the neck; the lesser

wing-coverts, the tail-coverts, and the lower part of the throat are bright carmine, and the tail-feathers are yellowish. It is slightly smaller than the European species. It makes



Spoonbill (*Platalea leucoroda*).

a coarse nest, usually in the top of a mangrove. The beautiful feathers of the wings are made into fans in Florida.

SPORADES, THE, are the Scattered Isles of the Aegean Sea, lying outside the compact group of the Cyclades, which lie in a circle round Delos. Those on the north, east, and south belong to Turkey, as Thasos, Imbros, Lemnos, Samos, Scapanto, Rhodes, Crete, &c., while those on the north-west, Skyro, Chaidromi, Skopelo, Skiatho, Pelagonisi, &c., belong to the kingdom of Greece. See ARCHIPELAGO, GREEK.

SPORANGIUM, in botany, is the term used in the higher groups of *CRYPTOGAMIA*, *Bryophyta* (liver-worts and mosses), and *Pteridophyta* (ferns, club-mosses, &c.), to denote the case in which the spores or reproductive cells are formed.

SPORES, in botany, are the specialized cells in cryptogamic or flowerless plants from which new plants are produced, answering to the seeds in the phanerogamic or flowering plants. Although these organs perform the same office in the economy of the plant as seeds, yet they differ essentially in structure. See REPRODUCTION.

It has been found convenient to restrict the term *spore* to those reproductive cells which are the result of an act of impregnation, either direct, or indirect through the production of a vegetative body which constitutes a second generation. All other non-sexual reproductive cells, as those of fungi, are called *conidia* or *gonidia* (Sachs's "Textbook of Botany").

SPORTS, BOOK OF, the popular name bestowed on a proclamation issued by James I. in 1618, by which it was declared that after divine service on Sundays, "no lawful recreation should be barred to the people, which should not tend to the breach of the laws of the kingdom and the canons of the church." This "lawful recreation" included archery, May-games, leaping, vaulting, and Whitsun ales. The proclamation was intended as a check upon the severity of the Puritan authorities in Lancashire, and during James' reign was not enforced. But in 1633 it was revived by Charles I. and Archbishop Laud, and so strictly carried out as to excite a bitter feeling in the minds of the Puritans, now become a great body of the people. In 1644, by order of the Long Parliament, all copies of it were called in and publicly burned.

SPOTTISWOOD, JOHN, Archbishop of St. Andrews, was born in 1565, in what is now the parish of Mid-Caldor, in the county of Edinburgh. When James set out for England, in April, 1603, Spottiswood was one of five Scottish clergymen whom he appointed to attend him. On the death of Bethune, archbishop of Glasgow, the king

nominated Spottiswood to that see. Spottiswood, as might be expected, employed his best exertions in re-edifying and strengthening the ecclesiastical system, of which he had thus been appointed one of the chief overseers. In June, 1615, on the death of Archbishop Gladstones, Spottiswood was appointed to the metropolitan see of St. Andrews.

In 1631 he drew upon himself a storm of popular odium by his conduct in instigating the oppressive proceedings against Lord Palmerino for the then capital crime of leasing-making (verbal sedition); and this was followed in 1637 by the ill-managed attempt to impose a liturgy on the Scottish Church, which was the immediate provocation of the rebellion against the government. He shared with the rest of the bishops in the destruction brought upon them order by its failure. He died on the 26th November, 1639, and was buried with great pomp near Westminster Abbey.

S.P.Q.R., an abbreviation among the ancient Romans of the words *Senatus Populusque Romanus*, "the Senate and the Roman people." This ancient formula is still preserved by the city government of Rome, and has, it is believed, never been lost all through the long ages. Yet it strikes the traveller oddly at first to see S.P.Q.R. on any dust-cart in Rome in these days.

SPRAIN or **STRAIN**, is an injury of the muscular or tendinous tissues, resulting from them being suddenly wringed or forcibly stretched beyond their natural length. Sprains of the ankle are a very common and at the same time a serious form of the injury. Where the injury is overt, medical advice should be sought as soon as possible, as it is often difficult to decide whether there is fracture or not. In slight cases treatment by rest, prolonged fomentation with hot water, and the use of a little tincture of ammonia may be sufficient, but even in slight cases medical advice is of value, for complications sometimes arise during the healing process, which if not relieved may lay the foundation of permanent disease of the joint. A sprain of one of the larger joints, such as the knee, is a serious injury, and one that calls for immediate recourse to medical aid, and the same must be said of sprains of the back. In all cases the general principles of treatment consist, first in subduing the inflammation and relieving the pain by means of rest, hot fomentations, the application of poppy heads, leeches, warm Goulard lotion, Laudanum, &c., and the use of frictions, stimulating lotions, &c., during the later stages of the disease.

SPRAT (*Clupea sprattus*) is a well-known fish, belonging to the same family and genus (*CLUPEA*) as the **HERRING**, which it greatly resembles in appearance, but is much smaller, being from 3 to 6 inches in length. Its body is proportionately deeper than in the herring, and the edge of the abdomen is strongly serrated. The tail is deeply forked, and the lower jaw prominent; the scales are large, round, smooth, and deciduous, and there are no teeth on the vomer. The number of vertebrae is from forty-seven to forty-nine, while in the herring there are fifty-six; the dorsal fin has fifteen to eighteen rays, that of the herring from seventeen to twenty, and the anal fin has from seventeen to twenty rays in the sprat, from sixteen to eighteen in the herring. The upper part of the head and back are dark blue with green reflections, passing into silvery white on the sides and belly; the caudal and dorsal fin are dusky, the other fins white.

The sprat is abundant on the Atlantic coasts of Europe, extending into the Baltic and the western half of the Mediterranean. They abound off many parts of the English coast during November and the three following months. The net used for their capture is similar to that used in the herring fishery, but with smaller meshes. The old idea that the sprat is the young of the herring, and that it is therefore injudicious to fish for it too extensively, is occasionally revived, but it does not appear to have any

other foundation than that sprats are very seldom found full of roe. Sprats are taken in large quantities in the Frith of Forth, and are there called "gavies." Dried sprats are a common article of provision among the poorer classes, and the kilkies brought from Riga and other Baltic ports are sprats cured with spices. Many of the boxes of so-called sardines, which are sent to all parts of the world from the west coast of France, are really filled with sprats; and it is a pity that English fishermen do not take a hint from their neighbours in that respect. The sprat certainly does not yet seem to be appreciated at its true value. They are often caught in such immense numbers as to be used for manure near the coast.

SPREE, a river of Prussia, upon which Berlin stands, rises near Ebersbach in Saxony, on the Bohemian frontier, and after a circuitous course north-west falls into the Havel at Spandau, a fortified town of great strength. It is generally shallow, flows through a level and frequently inundated country, and abounds in fish. In its course it forms the two lakes or meres of the Schwielochsee and Muggelsee. Berlin, Bantzen, Spornberg, Lubbin, and Bieskow are situated on this river, which the Mulrose Canal connects with the Oder. Length, 230 miles.

SPRING, the season of the youth of the year, when the buds burst then coverings and spring forth. The word "spring," in all the Teutonic tongues, means to burst or split. Thus when water bursts a way through the earth we call it a spring, and every cricketer has occasion to lament when a favourite bat springs. The namer, too, springs his name when he fires it.

Spring is perhaps the poet's favourite season; all the flowers seem so fresh and bright, and the song of the birds sounds so much the sweeter by contrast with the gloomy silent winter. As Spenser sings of his appearance heading the procession of the year:—

"First, lusty spring, all dight in leaves of flowers,
That freshly budded and new blossoms did bears,
In which a thousand birds had built their bowres,
That sweetly sung to call forth paramours."

The Roman way of beginning the year with the spring, which was our English way too for a long time, was certainly the right one. March is the true first month, and September, October, November, and December would then be the seventh, eighth, ninth, and tenth months respectively, as their (Latin) names imply.

Either our forefathers were much colder than we, or (as seems likely on other accounts also) the spring was formerly much warmer; for the contrast between the spring poetry of the ancients, or even that of the earliest of our own poets, and the actual season as we now know it, is a fruitful subject with the humorists of our time.

SPRING, in mechanics, is an elastic plate or rod, which is employed as a moving power, or a regulator of the motions of wheel-work; also to ascertain the weights of bodies, or to diminish the effects of concussion.

The elder Bernoulli was the first whose attention was directed to the curvature assumed by elastic bodies, and he succeeded in resolving the problem in the case of a rectilinear plate being fixed at one end and bent by a weight applied at the other; it being assumed as a principle that, at any point in an elastic body, the force by which the body when bent by any power endeavours to recover its previous position is proportional to the curvature at that point; that is, to the reciprocal of the radius of curvature.

The mathematical theory of the elastic plate may be seen in Poisson's "*Traité de Mécanique*" (No. 316), and in other works. It must suffice here to observe that when such plate is fixed at one end, in a horizontal position, and a weight is applied at the opposite end, the whole deflection varies nearly as the applied weight and as the cube of the length of the plate.

The use of a spring as a moving power may be best exemplified in its application to watch-work. The main-spring of a watch is a thin and narrow plate of well-tempered steel, which is coiled in a spiral form; one of its extremities is attached to a pivot or axle, and the other to the interior circumference of the cylindrical box in which it is contained. In being wound, the spring closes round the axle, and afterwards, in the effort by its elasticity to recover its former position, it turns the cylinder in a contrary direction: thus the chain which is attached to the exterior circumference of the cylinder and to the fusee causes the latter to revolve.

A slender and highly elastic spring of a like form is employed to regulate the oscillations of the balance-wheel of a watch. One extremity of the spring is attached to the balance, and the other to some fixed point. The elastic force of the spring is directly proportional to the angle through which the spring is wound by the turning of the balance-wheel; hence the oscillations are isochronous. The stiffness of a spring is diminished by heat and increased by cold; hence heat tends to make a watch go slower, and cold to make it go faster. In chronometers, contrivances are used to compensate for these effects.

SPRING, CARRIAGE. Various methods are adopted for lessening the concussion occasioned by the rolling of a wheeled carriage over a rough road. One of the simplest means is that often adopted in light carts, of suspending the seat from the sides of the body by leather straps or lashings. Next to this is the use of straps to suspend the body itself, an expedient which seems to have been occasionally resorted to from a very early period. With very few exceptions, it appears that slung or suspended carriages were not used until the seventeenth century. To remedy the defects of the primitive slung carriage, it was desirable to render the pillars from which the straps were suspended somewhat elastic. Hence arose the use of elastic steel supports, which have gradually assumed the form now well known as C-springs. The curved part of a C-spring usually consists of two-thirds of a circle, and one end of the curve is lengthened out into a tangent, the tangent being laid horizontally and bolted down to the framework of the carriage. These were formerly used for almost all kinds of carriage springs; but the great improvement of our roads has made way for the introduction, in all railway carriages, stage coaches, and in many private carriages, of the more compact straight and elliptic springs.

Carriage springs are usually formed of several thin plates of steel, of various lengths, so laid and fastened together that the spring shall be thick in the centre, or at the end by which it is fixed, and thin, or consisting of only a single plate, at the end or ends where the greatest play is required.

SPRING TIDE, the tide occurring at or soon after the new and full moon, which rises higher than common tides. At these times the sun and moon are in a straight line with the earth, and their combined influence in raising the waters of the ocean is the greatest; consequently the tides thus produced are the highest.

SPRING-BALANCE, a machine in which the elasticity of a spring of tempered steel is employed as a means of measuring weight or pressure, or other force. One of the simplest kinds of spring-balance is the Spring Steelyard or Pocket Steelyard. This instrument consists of a helical spring placed in the interior of a tube of brass or iron, closed at both ends, one end of the spring abutting against the plate which closes the lower end of the tube. A rod, having a hook or loop at its lower extremity, passes through a hole in the bottom of the tube and up the inside of the spring. At the upper end of this rod is a small plate, which slides up and down like a piston in the tube, and rests upon the upper or free end of the spring; thereby causing it to collapse when a heavy body is attached to the hook at the bottom of the sliding rod. The extent of the motion of the spring, and consequently the weight of the body suspended from it, are indicated by the degree to which the rod is drawn out of the tube; for which purpose a graduated scale is engraved upon the rod.

Many varieties of spring-balance are manufactured, and similar instruments are applied to many useful purposes besides weighing; for example, for measuring the force used in drawing a carriage, or towing a vessel, in which case the instrument is called a *dynamometer*; for measuring the intensity of the pressure of steam, or other elastic fluids, when it is called a *spring pressure-gauge*; and when self-registering and applied to a steam-engine, an *indicator*, &c.

SPRING BOK (*Gazella euchores*) is a species of **ANTelope** found in South Africa, and nearly allied to the gazelle. It is a graceful creature, swift, light, well-formed, of agreeable colours and with long delicate limbs. The horns are black, lyrate, prominently ringed, and curved inwards at the tips; they are very small in the female. The head is almost wholly white; the upper parts of the body are a rusty brown, the lower snow-white, with a broad red band on the flanks. There are several folds of skin over the rump and loins, which are expanded when the animal is excited. Its height is about 2½ feet. The tail is about 8 inches in length, and tufted with black hairs. The springbok derives its name from its habit, when alarmed, of springing straight up into the air to a height of from 7 to 10 feet. The springbok is a gregarious animal, and gathers in immense herds on the vast open plains of South Africa. These herds are said to migrate from north to south and back with the monsoons.

SPRINGER. See **SPANIEL**.

